Buy New EQUIPMENT *Now !*

AT no time in the history of industry has it been so necessary for you to possess all favorable factors for getting work out economically and speedily. Never before have costs had to be watched with such keenness.

Every day that you work old obsolete equipment you are voluntarily handicapping yourself. If there is a machine on the market which will do some portion of your work better than you are doing it, depend on it that some wide-awake competitor will have it. Depend upon it also, that, being in a more favorable position to do the work, he will eventually take it away from you or he will so lower the price as to make it uneconomical for you to do it.

Can you afford to be out of date? The installation of modern Beloit equipment means an outlay *once only*--but working the old equipment means a continuous dipping into your pocket--for wasted energy, wasted time and wasted materials. These things are a constant drain on you, but you get so used to them that you hardly recognize their cost. Yet, you are daily losing money by not having your plant modernized.

Modern Suction Presses

Rubber-Covered Suction Roll

High-Speed Shake

Hypoid Bevel Gear Drive

Silent Chain Dryer Drive

Balanced, Oilless Steam Joint

Hi-Speed Dryer Condensate Remover

Automatic Winder and Roll Unloader

Making a complete check-up now, and placing the problem in our hands for solution, will pay you big dividends.

The BELOIT Way is the MODERN Way

BELOIT

Beloit Iron Works, Beloit, Wis., U.S.A. Founded 1858

ADVERTISING PAGES REMOVED

THE PAPER INDUSTRY

DECEMBER, 1935
Vol. 17—No. 9

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

LEADING ARTICLES

Four Characteristics that make up a Salesman's Attitude..... *Edward J. White* 647
Finishing Room Operating Suggestions..... *John Horney* 648
Multi-Stage Freeness Control in Newsprint Production..... *C. O. Bachman* 649
Lime in the Manufacture of Paper..... *John W. Stockett, Jr.* 652
Casein Glues..... *Fred Holt, Jr.* 656
Power Plant Painting and Illumination..... *R. H. Bacon* 658
Paulson Process for Spent Sulphite Liquor Utilization..... *Sidney D. Wells* 659
Special Meeting of the A. P. & P. A. 661
Demand for Paper Stronger Since Early Spring Lull..... 663

REGULAR DEPARTMENTS

Editorials 627-628
Current Thought 630
Paper Sketches 655
New Publications 667
Opportunity Section 668
Safety Contest Scores..... 671
Power 673
Technical Developments ... 675
Papermaking Patents 681
Commercial Outlook 683
Domestic Raw Materials.... 685
Imports and Exports..... 687
Advertisers' Classified Index 689
Index to Advertisers 693

EDWARD B. FRITZ, Publisher
HARRY E. WESTON, Editor
B. MERRITHEW, Assistant Editor
A. SCOTT DOWD, Advertising Manager

PUBLICATION OFFICE
Chicago, Illinois
333 N. Michigan Ave.
Dearborn 8877

Eastern Office
New York, N. Y.
342 Madison Ave.
Murray Hill 2-7358

Pacific Coast Office
Los Angeles, Calif.
1031 S. Broadway
Westmore 8501

Entered as second-class matter at the Post Office at Chicago, Illinois, February 13, 1920, under the Act of March 3, 1879. Subscriptions in the United States, Alaska, Hawaii, Philippines, Porto Rico, Cuba and Mexico, $2.00 per year. Canada, $2.50 per year. Other countries, $3.00 per year

Copyrighted 1935 by Edward B. Fritz, Publisher.

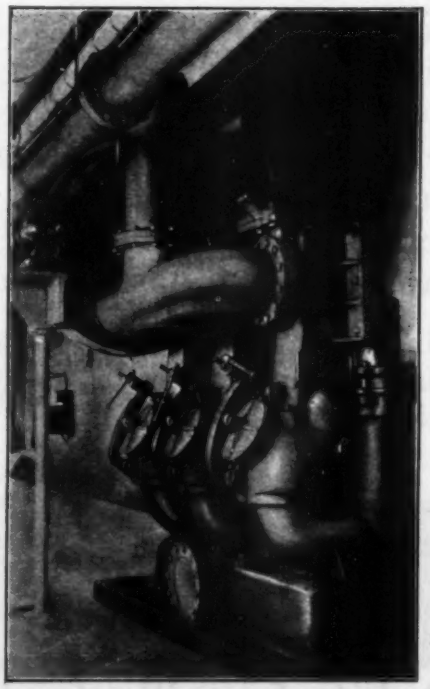
Don't Use a Graphited Packing in the Stock Pumps

SQUARE
ODORLESS TASTELESS STAINLESS KLERO PACKING

contains no graphite in its lubricating compound, or any other objectionable ingredient, that can work its way into the finished product.

The first cost may be higher than flax or other insufficiently lubricated packings, but its length of life in service makes it far more economical in the long run. Its lubricant has a high melting point, preserving both packing and pump shaft.

Our claim for superiority can be proven by actual working tests. Send for free working sample. State size.



GREENE, TWEED & CO.
Sole Manufacturers
109 DUANE STREET NEW YORK CITY

Paper Prices Due to Advance

THERE should be smiles on the faces of the mill men of the paper industry and chortles of joy in their throats, but there are none.

The paper industry shared with all other divisions of industry a remarkable upward surge in tonnage expansion during the fall months which is destined to carry over into the first of the year with still higher figures.

In some divisions of the industry, the paper expansion was epochal—nothing like that tonnage volume has been seen since 1920. This is more significant because the general business activity figure at its peak this fall shows only 68.2 per cent of normal, while in some divisions, particularly the kraft paper division, including the reports from fifty operating mills, it shows an average of 85.86 per cent of orders received over a period of ten to eleven weeks. In other words, the paper industry is doing a volume business approximating the 1920 figures but on a business activity that is some 32 per cent under normal.

Under these conditions, it is not hard to predict what the tonnage volume will reach when the general business activity figure reaches seventy-five or eighty per cent as it is certainly scheduled to reach in the early months of 1936.

The absence of smiles and lack of gurgles of joy over this changed condition of a year ago is accounted for by the fact that this unprecedented volume of satisfactory tonnage permits no profit to the producing units and the reason that there is no profit on these volume tonnage operations is because prices are too low and the mills have endeavored to absorb additional advanced costs with no compensating rise in price.

The last advance in price was made in December, 1933—two long years ago—and since that date, continuous advance in labor, raw materials, freight rates and taxes have been absorbed by the mills and yet there has been an industry reluctance to advance prices.

The time, however, has come when prices must be raised. Either that or the mills must close down. The paper industry has endeavored to serve its clients —endeavored to serve them too long—at a loss to the industry itself. Reconditioning, repairs, and replacement of worn and obsolete machinery must be made and there is only one way that it can be done—out of the revenue which the mills derive from the selling prices of their paper.

There is no way for the paper mills to refinance. Capital is only seeking investment in profit-making divisions of industry and it is an outstanding paradox that there should be billions of idle capital drawing no interest and awaiting investment and none of it available to the mills of the paper industry.

The reluctance to advance prices must give way. Labor must be sustained. Cost of living is advancing and labor and raw material producers must be compensated on a continuously higher basis. The only way that the paper industry can continue to operate and keep in step with the continued inflation that demands recognition is to advance prices. The industry never has had before it so clean and clear-cut a demand for revision of its prices upward as it has today. An advance may be justified both from the standpoint of cost, preservation of the industry and to the fulfillment of the social obligations that seem to be such a major part of the present administration's thinking.

There is no profit, honor or continuity of life for an industry that sells its commodities at less than cost. The first principle of industry is the consumer must pay at least the cost of the goods he consumes.

+ EDITORIAL +

Knowledge Is Power

IS THERE anyone who will deny the statement of Francis Bacon that knowledge is power? It is doubtful if such an individual could be found, as down through the ages the value of knowledge has impressed itself more and more indelibly upon the minds of each passing generation. At the same time, with broadened horizons and fuller lives there has come a fuller appreciation of the individual need for knowledge.

Scientific and technologic progress has been so rapid within the past few years that there has been created a need for greater and greater specialization on the part of the individual. Changes have occurred and are occurring so rapidly in what might be termed limited fields of scientific and industrial endeavor that even the most fertile minds have not and will not be able to keep up with them except in a very limited way.

Man's desire, however, to perpetuate his knowledge and his findings and to make this information available to the world has found expression in the written word through the printed pages of magazines, books, and other forms of literature. Think, if you will, of the volume of papermaking literature that has been accumulated during the past quarter of a century and how helpful this literature has been in the progressive development of the industry.

What is true of the literature of papermaking is true in a bigger way of the more general and yet highly technical field of engineering. To use this vast fund of technical literature that has been made available, and it is only through use that it has any value, requires a reference source of subject material.

The busy engineer or other interested student of engineering literature has found the *Engineering Index* as a valuable working tool in this connection. This Index, which covers the whole field of engineering, including chemical engineering distinct from chemistry proper, has made the individual search of important and necessary literature references less tedious and has been a saver of immeasurable time for him.

In fact, the service of the *Engineering Index* includes the indexing and annotation of approximately 2,000 different technical publications emanating from 40 different countries and from every continent of the world. This index in no way supplants the excellent bibliographical work that is being done by several organizations within the pulp and paper industry but it is an important complement to it.

To save and perpetuate this tool, which has fallen into financial straits, a group of far-seeing engineers, educators and industrialists, headed by Dean Collins P. Bliss, Dr. Frank B. Jewett and Dr. John V. N. Dorr, are undertaking to raise a working capital fund to see the Index through a five-year period under a plan which will make it self-sustaining at the end of that time. This effort is deserving of the consideration and the support of the pulp and paper making industry.

As an engineer or technical man in this industry, have you broached the subject of support to the management of your company? If you have not done so, do not delay but do it now so that this service which has been going on for many years may not stop. As an executive interested in the technical aspects of the industry and in the general advancement of engineering knowledge, look into the situation and ascertain what you and your company can do to aid in the continuance of this service. Simply address your communication to Dean Collins P. Bliss, College of Engineering, New York University, University Heights, New York City.

Universal Peace

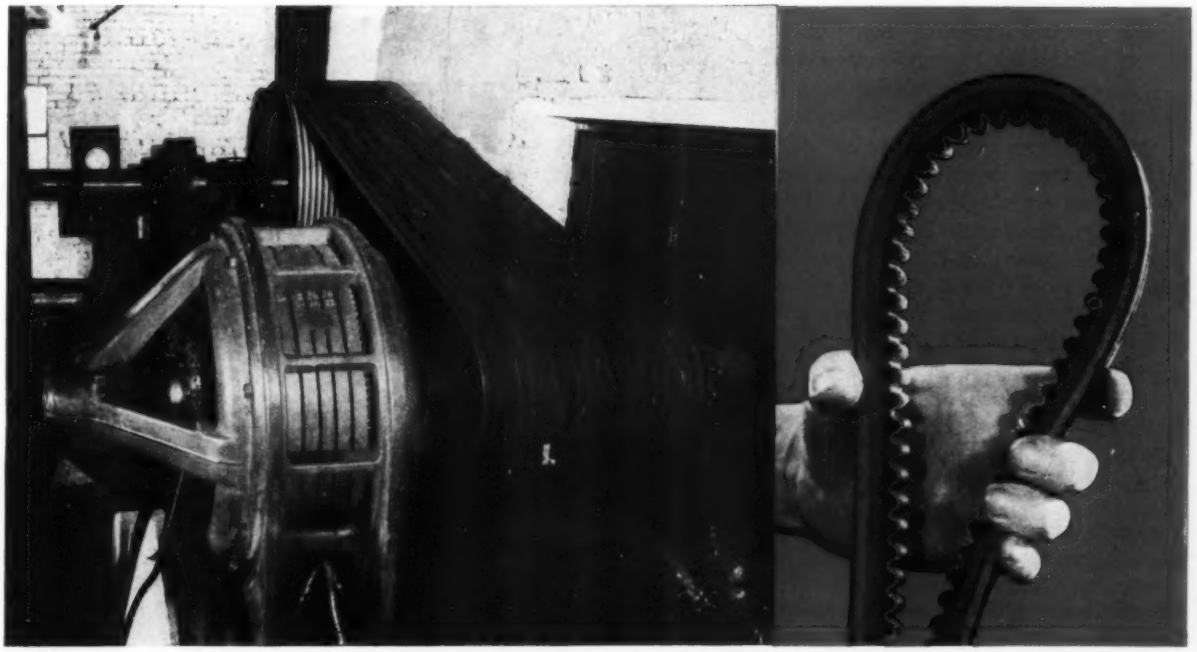
SCIENTISTS recently have explained the identity of the Star of Bethlehem and its place in the firmament. They believe at that time three of the largest planets were in such position that they appeared as one great, brilliant star, forming an unusual phenomenon—a heavenly beacon wrought by the hand of infinite wisdom to lead the wise men to the birthplace of the Christ, he who was to bring peace to a troubled world.

A majority of the countries of the earth now are seeking the way to world peace, that all people may enjoy useful, contented lives. These governments have known the futility of warring against each other —they have reaped the harvest of hatred and strife. But parleys, persuasion, reprimand or force never can govern the tactics of nations, and although a unity of purpose may lead them to a promised land of peace, there can be no real or lasting harmonious existence until it is established permanently in the hearts of the people as individuals.

That first Christmas gave to the world the great Teacher, the Prince of Peace—he who by precept and example pointed the way from darkness, fear and strife to paths of light, life and love. And as the Holiday Season approaches when all nations celebrate his birth, it is not only fitting, but it is the privilege of every person, regardless of nationality or creed, to strive for that inner peace which is the very essence of the great brotherhood of all mankind.

The publisher of "The Paper Industry" and his staff extend to all advertisers and friends sincere Greetings of the Season, with a deep appreciation for the pleasant associations of the past year. May peace and good-will be with everyone this Christmas and may the New Year be a very happy one, bringing a realization of cherished desires and fostered hopes.

DAYTON COG-BELT DRIVES
effect unusual savings in Power _Operating Costs_Floor Space



The only V-Belt that is specifically Built-to-Bend. The scientific construction of these belts makes possible the amazing performance of Dayton Cog-Belt Drives

The installation of Dayton V-Belt Drives has enabled plant and production managers to solve many troublesome and unusual power transmission problems. In addition, savings amounting to thousands of dollars a year have been effected.

A striking example of savings that can be effected is found in a coal mine Ventilating Fan Installation. The original drive had a center distance of 25 feet. The edges of the belt were being constantly torn by rubbing on the wall of the building. This drive was replaced with a Dayton Cog-Belt Drive with a center distance of only 10 feet. This change not only saved belts and space but it also eliminated the constant danger of drive failure. The Dayton Cog-Belt Drive was found to be in perfect condition after a long period of continuous running.

Similar savings have been made in plants of all kinds where Dayton V-Belts have been installed. Here are some of the reasons why: Dayton V-Belts are "built-to-bend." Their exclusive and patented construction makes them more flexible. They are die-cut, not molded, and accurately fit the grooves of all standard pulleys. Their rigid crosswise construction prevents distortion—there is no slipping or weaving. This means smoother running . . . positive speed . . . less tension . . . less wear on bearings. Machines last longer and there's practically no maintenance cost.

But there's much more to tell. Let us give you all the facts about the many exclusive advantages of Dayton V-Belt Drives. Wire or write today.

THE DAYTON RUBBER MFG. CO.
Dayton, Ohio
The World's Largest Manufacturers of V-Belts

Dayton
COG-BELT DRIVES

Cog-Belt Drives—F. H. P. V-Belt Drives—V-Flat Drives—Complete Drives, Pulleys and Belts in Stock. Fractional to 100 H. P.

ADVERTISING PAGES REMOVED

Tammany Tactics

By WILLIAM SIBLEY

LATE in September, 1932, Franklin Delano Roosevelt was campaigning for the presidency of the United States. In one of his campaign speeches (made at Sioux City, Iowa) he said:

> "I accuse the present administration of being the greatest spending administration in peace times in all our history—one which has piled bureau on bureau, commission on commission, and has failed to anticipate the dire needs of reduced earning power of the people."

Today there are *fifty* more government agencies than there were in March, 1933. Since the past election day, the population of the United States has increased something less than two per cent. During the same period the number of people on the federal payroll has increased more than 25 per cent. Two years ago there were 65,000 people on the federal payroll in Washington, D. C., alone. Today, there are over 105,000. Throughout the United States there are considerably more than one and one-half million people drawing pay from the Government.

As unbelievable, unbusinesslike and uneconomic as it might seem, it would be a physical impossibility for *anyone*, including Mr. Roosevelt, to learn exactly how many men and women are now drawing pay from the Government. Manifestly, no one knows. Payrolls are growing too fast and this fact coupled with lack of co-ordination and correlation of effort makes such a finding an impossibility.

Of further interest to the man who pays taxes (and anyone who smokes a package of cigarettes a day, in Illinois for instance, pays a total of $14.75 a year in direct taxes) is the fact that about six months ago the Agricultural Adjustment Administration had entered into contracts with more than three million farmers—the number of contracts totaling well over three and a quarter million. Also, that there are about 600,000 men now employed in CCC camps—these men requiring between 80,000 and 90,000 government employees for their supervision and control. Additionally, that the single agency of the PWA is now spending federal money at the rate of about one and a quarter billion dollars a year.

However depressing the thought, it is none the less true that the 200,000 people now engaged in distributing relief through the FERA probably will be continuing their disbursement for years to come. To complete even the existing PWA jobs will require an increased number of workers and at least three years of time. Mr. Roosevelt recently has assured us that the AAA is to be a permanent feature of our governmental structure; while the conservation camps are now being re-shaped for permanent acquisition to the ship of state.

It may be narrow bias on my part to advance the thought that this governmental structure is being set up, not so much for the welfare of the people, as for self-preservation and self-perpetuation. But, however narrow my bias, there is a distinct, readily discernible parallel between the structure of the New Deal and that of Tammany. For years on end Tammany succeeded at elections because of its policy of retaining enough payrollers to form a sufficiently large nucleus of votes to swing any election. Not that the majority of the voters were on the payroll of Tammany. Not at all. But enough of them were to create, of themselves, their families and their friends, a large bloc of influence. Large enough, indeed, so that Tammany could go out at election time and corral enough outside votes (by the usual band-wagon ballyhoo) to swing the results into the predetermined line.

Whoever opposes the New Deal at the coming election will have a hard job. He not only will have the job of convincing many that the New Deal is a *Misdeal*, but he will have to convince literally millions of payrollers and farmers against their own will—which is dominated by their individual pocketbooks. Nor is it anything but sombre to realize that should the opposition do the seemingly impossible and gain the election—the winner would be almost impotent to sweep back the tide of office-holders and tax-suckers.

The great majority of the recently established governmental structure was foisted on us under the guise of being temporary, or "emergency measures." Bureaus are almost never temporary. Someone, I've forgotten who, spoke the truth when he said that "few die and none resign." Practically no commission or bureau ever quits when its job is done. Invariably they stay on for research, to write their own history, to ponder conclusions, or whatnot. And the disease is so deep-seated that partisan politics never can effect a cure. A November landslide in a different direction merely sees a change of faces. The old desks are still occupied, and new ones moved in to the tune of additional buildings.

All of which may sound lugubrious to the extent of justifying the belief that I am suffering from indigestion. But such is not the case. My Thanksgiving dinner was temperate—and filled with thanks. Thanks that we are yet free from the dogmatic dictatorships of a Hitler, Mussolini, or Stalin. We have much to be thankful for; but gentlemen, we have much to think about. The continued growth of the present bureaucracy most certainly will make our progeny realize that the New Deal was in reality the New Despotism.

THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

Four Characteristics that make up a *Salesman's Attitude*

EDWARD J. WHITE
Peavey Paper Products Company

FOR the past three years, it has been the author's privilege to serve as instructor and guide in the training of new men as salesmen for his company. During this period, several young men were trained by him. About one-half of these student-salesmen proved themselves to be failures, not only to the instructor, but to themselves as well. And not one of those who failed to make good ever complained that he was the victim of circumstances or did not "get the breaks."

The failure of half of these men and the success of the remainder lead to the interesting question as to what particular factor or factors had been responsible for these results. The implications of the question motived the investigation. The method used was to question both types as to the reason or reasons for ability, or a lack of same. The answers evidenced a definite tendency to swing to either side on the question of attitude. (The aptitude and intelligence of both groups, on a test based upon Binet, varied but slightly of norm.)

Attitude might be considered an elusive word and some may ask how it could be applied to a state of mind, particularly in relation to salesmanship. If a salesman knows or does not know a ten-pound tissue from an eighteen-pound crepe, the fact is detected very easily. There can be no successful evasion on such a point. But *attitude* is more difficult to evaluate. The man who talks fast and convincingly is not always sincere in what he says. Mere conversation, then, is not indicative of the man's qualifications; it is necessary to delve into his mental habits.

In this particular inquiry, knowledge of the mental reactions of the salesman was gained through companionship. He and the instructor worked together, ate together and traveled together. From this mutual interchange of ideas, certain mental habits were distinctly manifested.

First, the habit of *loyalty* was observed. The successful salesman has faith in his merchandise. He believes that his mill makes the best paper that can be obtained to suit the requirements of his trade. He feels that he is a vital part of a good organization. He looks upon the organization, which includes himself, as a team striving for a goal against competitors. This is the spirit that wins. He realizes that the squad of the "Fighting Irish" never won a game by desiring to play on the opponent's team.

Second of the important characteristics making up attitude is *sincerity*. A good salesman is honest in his own mind. He stands behind his product with the courage of conviction. The thought that the price asked by his mill may be exorbitant as compared to that of a competitor never enters his mind. He is convinced that the quality of the paper justifies the price. He knows that back of his product are hundreds of men working in unison toward a common goal. He knows that the interest of these men lies not solely in providing a job for themselves, but that they, too, as true craftsmen, find satisfaction in a good product well made.

The third of the elements comprising attitude is *curiosity*. It is invariably true that the capable salesman is the one who asks the most questions concerning the merchandise, the mill and the personnel. His is not an idle curiosity but a healthy thirst for the accumulation of facts and all the interesting angles of those facts. The skillful salesman has that deep, steady, intellectual curiosity concerning the unknown which leads to knowledge. Not satisfied in knowing about his own mill, he turns his attention to the mills of his competitors. He studies the problems of the merchants and the wants

of the consumers. In short, the successful salesman is a well informed man. A well informed salesman is usually an interesting man and is a welcome one in any merchant's office.

Last, but not the least important, is that characteristic of *confidence* of ultimate success. The efficient salesman adapts to his own use that quotation attributed to Abraham Lincoln to the effect that "What man has done before, man can do again." The confident salesman does not become discouraged easily because of a lost order. The reason for losing the order is studied and, finding the cause, he seeks to correct the fault. He knows that even the mighty Dempsey missed a good punch now and then. The average is what counts. The effect of this attitude on the salesman during his daily work has a steadying influence. Aside from its mental value in the elimination of the fear complex, this habit of inner confidence brings into play its physical counterpart, poise, which is an incalculable aid to any salesman.

Loyalty, sincerity, curiosity and confidence in one's self have been discussed here to determine the attitude of the salesman. It is not implied that a correct attitude is the sole requisite of the successful salesman. However, it does appear that the lack of the correct attitude is the chief stumbling block in attaining favorable results. Regardless of the willingness to work and the ability of a salesman, his best efforts are frustrated if he lacks the knowledge of the means to use this ability. Many salesmen rely upon the use of much shoe leather to accomplish that which correct mental habits can accomplish with less energy and with greater results. This type of man is unjust to himself and to his employer. He never will feel successful in his own mind.

If a man likes to sell and is willing to try but finds he loses more orders than he receives, let him take stock of his method of utilizing those natural powers within himself. Let him ask himself these questions: How is my attitude? Would I rather work for my present concern than for any other? Am I sincere enough about my company to know that its personnel is as fine a group of people and its products as good as those of any competitor? Have I been mentally curious enough to find out the things which interest my customers and have I presented them in a pleasing manner? Do I allow myself to become easily discouraged and thus allow my fellow salesmen to carry the burden.

The answers to these questions will go far toward solving the difficulty. An honest attempt to answer them will eliminate the necessity of using the old trial-and-error method of selling. A correct attitude will provide a sound psychological basis upon which to build the most efficient method of salesmanship.

Finishing Room Operating Suggestions

JOHN HORNEY

PASTERS should be flagged on both sides of roll in machine room so cutter man can mark his load with a flag at the precise place where splice comes over the cutter so tiers will not need to look through two or three hundred sheets to find it. The same applies when roll is broken off or if an extra roll is threaded into the cutter while running. Tags used to mark the defect on lay-boy can read "Paster," "Wrinkles," "Broke" or "Short Count" so tiers will know what to look for.

High finished jumbo, or log rolls, will pull into wrinkles if too much friction is applied on the back stands. If the cutter speed is over 200 feet per minute, friction will increase tremendously after one-quarter to one-third of the paper has run off, and should be adjusted every fifteen or twenty minutes. Too little friction, however, will cause a crush-wrinkle, which is much harder to find than one caused by too much friction. A rough surfaced paper like pencil tablet and novel will run much better if a lot of friction is used, and the only limit to the number of rolls that can be cut at one time should be what the slitters will cut clean, provided rolls are furnished in good condition from the machine room.

Speed on the regular cutters (meaning cutters running from 175 to 350 ft. per minute) is usually affected by the humidity of the cutter room more than anything else. A steam spray, under the straps carrying the paper, will help a lot in winter to make good loads and increase speed, but care must be used so steam will not go directly upwards, and a 70-mesh wire should be used over the pipe opening to keep condensed steam away from the sheet.

Dry hardwood strips, four inches apart on board below bed plate knife and reaching within one inch of straps, will keep corners from turning under on light weight papers when running into lay-boy, and save a lot of annoyance and work for the tiers.

Considerable tonnage is put up with tape used on bundles instead of rope. It does a neater job, and gives a better surface on which to mark the size, grade and weight. The paper has no rope marks and is just as cheap to pack. Taping applies to flat stock mostly, but occasionally a customer will prefer a soft-fold bundle with tape instead of rope. If bundles must be reshipped LCL from wholesale paper house, taped bundles will not stand up, but direct shipments will look neater with tape and produce less waste to the printer.

Skid shipping of paper (if the printer uses a sufficient amount of it so he uses a lift truck), is a very good way to put up paper, but not as cheap to the mill unless skids are paid for by the buyer. The paper shipped from some mills is very bulky, and skids must be piled 75 to 85 inches high in order to get tonnage into a 50-foot car. Skids are tied to side of car with 1¼-inch steel bands in units of eight to ten skids, and unless paper goes a very long distance, does not require any other bracing. This way skids are hugged tight against one side of car and cannot move sideways. Extra anchored band keeps skids from floating, and gives the man a chance to put his truck under skid without re-stacking some of them at the other end of trip.

Multi-Stage Freeness Control

in Newsprint Production

C. O. BACHMAN, Consulting Engineer

PRESENT market conditions make it apparent that the paper industry no longer can thrive on guesswork methods of production and that paper must be produced and sold on a basis of quality. This situation likewise reveals the need for a positive method of stock control—a method which, to a great extent, will permit the quality and characteristics of a sheet to be predetermined before the stock from which it is to be made is run on the paper machine.

It is appreciated that such control would have to cover a wide range of variables and would have to be subject to ready application. What better way is there to obtain it than through the use of suitable freeness readings?

Several methods of freeness testing have been employed in the past and are being employed at present with more or less success. Unfortunately, these methods deal most with fiber length and not with the drainage speed of stock to be run on the paper machine wire.

The importance of drainage speed in relationship to sheet formation is comprehended more fully when it is considered that the sheet on a 1,000 feet per minute paper machine must be formed completely in less than a few seconds. It likewise should be recalled that only about one-half of the actual wire mesh area of a 60-mesh wire in such a set-up is for the purpose of drainage; the balance of the surface area is made up of the wire itself. Another fact is that the water does not drain directly through the fibers but away from the fiber surfaces and through voids of the sheet formation. In addition, the temperature of the head box stock influences both drainage and formation as well as the strength of the finished sheet. Such conditions make the problem of control a complex one; yet control is possible within close limits provided the stock has the correct multi-stage freeness factor.

To explain: In a machine furnish of 80 per cent groundwood and 20 per cent sulphite, the groundwood must have the proper freeness factors to permit the formation of a quality sheet on the paper machine and to produce efficient machine running conditions with a minimum number of breaks. Figure 1 reveals the effect of temperature on stock drainage over a temperature range experienced in most mills. Figure 2 indicates the multi-stage freeness of groundwood, sulphite and paper machine stock.

It will be noted from an analysis of Figure 1 that the lower the temperature, the slower the drainage—an obvious fact, but one too often overlooked in preparing a machine furnish. In the case of Figure 2, the paper machine furnish was 85 per cent groundwood and 15 per cent sulphite, and the head box temperature, 76 deg. Fahr.

The dotted line portion of the 100 per cent groundwood curve of Figure 2 indicates the freeness characteristics of groundwood stock that gave best results on the paper machine over an operating period of several years. It will be noted that the drainage and freeness curve of the groundwood stock is very uniform and does not show any radical surges from the starting point to the end point. A stock of this nature will produce a well-formed sheet of uniform strength.

A stock covered by the curve of Figure 3, on the other hand, will produce a very open and weak sheet. At the same time, the sheet will not dry uniformly; neither will it take a good finish.

Such assertions may be made because the curve indicates that the drainage factor for the stock is out of balance with paper machine wire drainage, the drainage being too rapid at the beginning of the forming cycle. This condition causes the stock to open up on the wire and creates a choppy and wild sheet.

The statement is often made by machine tenders that the stock is off—that the water literally falls out of the sheet long before it gets to the suction boxes. If a freeness test were made of such a stock, it would be found to resemble very closely the curve in Figure 3.

Returning to Figure 1, for further analysis, the critical point of drainage changes takes place between 400 and 700 cubic centimeters of discharge. It might seem that this slight differential would not interfere seriously with sheet formation. Yet, it has been found that such is not the case, the sheet actually having formed on the wire from about the 550 cubic centimeter range. The balance of the cycle, after the drainage of the stock has reached the set formation point, is not formation drainage, but actual drainage from the formed sheet as it passes over the table rolls and suction boxes.

If the end point reading is too far up the scale in ratio to stock temperature, and the formation multi-stage readings are up to 700 cubic centimeters, it will be found that a sheet made from such stock will flash over the boxes and will not dry on the wire. Sometimes such a stock is termed erratic and too slow. In reality, this stock is not too slow, but is one which forms too rapidly at the beginning of the formation cycle without allowing enough water to drain away at the start. A condition of this kind causes the sheet to close up and form a filter mat, thus retaining too long the water in the sheet and producing an inferior sheet in respect to machine operation, drying, strength and finish.

To be even more specific, a stock represented by the 45 deg. Fahr. curve has a 700 reading of 42 seconds and an end point reading of 92 seconds, a differential of 50; while a stock represented by the 85 deg. Fahr. curve has a 700 reading of 24 seconds and an end point reading of 57 seconds, a differential of 33 seconds. The difference in the end point readings of these two stocks is 35 seconds or approximately 38 per cent, while at the 700 reading it is 18 seconds or approximately 43 per cent.

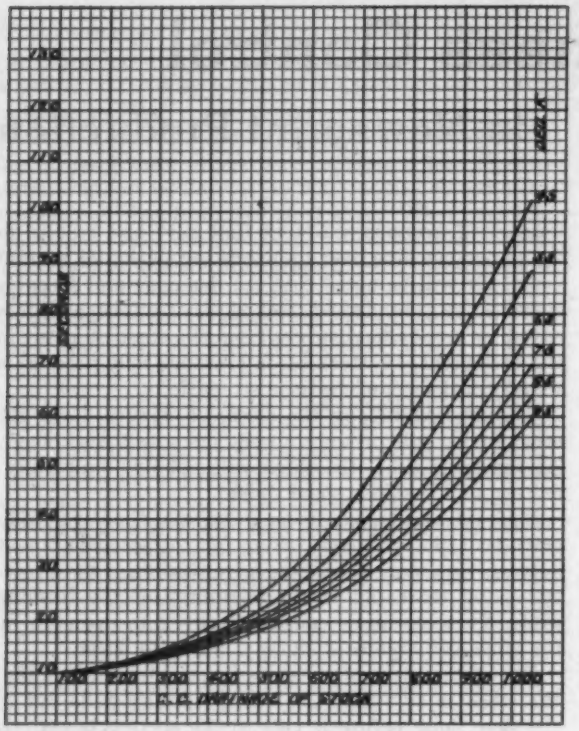


Fig. 1—Effect of temperature on stock drainage. (Note: The higher the reading in seconds, the slower the stock freeness)

The stock represented by the 45 deg. Fahr. curve was ground for a head box temperature of 45 deg. Fahr., while the stock represented by the 85 deg. Fahr. curve was ground for a head box temperature of 85 deg. Fahr. If a stock with characteristics of the stock represented by the 45 deg. Fahr. curve were run over a machine with a head box temperature of 85 deg. Fahr., it would give no end of trouble because of improper drainage. It demonstrates that stock freeness during the formation cycle is of utmost importance and should be given close attention in the wood grinding operation. Stock freeness in the multi-stage method of control deals not only with fiber lengths but also with time limit of formation, initial drainage speed and end point drainage of stock. The length of time in seconds to complete sheet formation without mechanical means of water removal is referred to as freeness speed.

In Figure 2, the semi-dotted line represents the freeness characteristics of a groundwood stock that was ground for a machine furnish of 15 per cent sulphite and 85 per cent groundwood and a head box temperature of 76 deg. Fahr.; the upper of the two solid-line curves the complete paper machine stock furnish of 85 per cent groundwood and 15 per cent sulphite; and the lower solid-line curve the sulphite stock.

The stock represented by the curve of Figure 3, as stated previously, has a very high initial drainage speed and a high end point reading. In this instance, the ratio of drainage is out of balance—the drainage up to 700 cubic centimeter reading being too rapid and from thereon too slow. Such stock characteristics cause the water to drop out of a sheet close to the slice. This condition does not allow the sheet to form properly while the stock is still in a state of very low consistence. The stock reaches the suction boxes in the form of an open sheet of poor quality for high speed news.

The following readings show a comparison made of stock represented by Figure 3 and paper machine stock of Figure 2:

PAPER MACHINE STOCK OF FIG. 2

C. C. Freeness	*Seconds**
700	45
800	60
900	84
1000	112

STOCK OF FIG. 3

C. C. Freeness	*Seconds**
700	37
800	64
900	94
1000	122

* Seconds per 100 c. c. drainage. The higher the readings in seconds, the slower the stock freeness. All tests taken at head box consistence and at temperature of 76 deg. Fahr.

From this comparison it will be noted that the paper machine stock of Figure 2 is eight seconds slower than

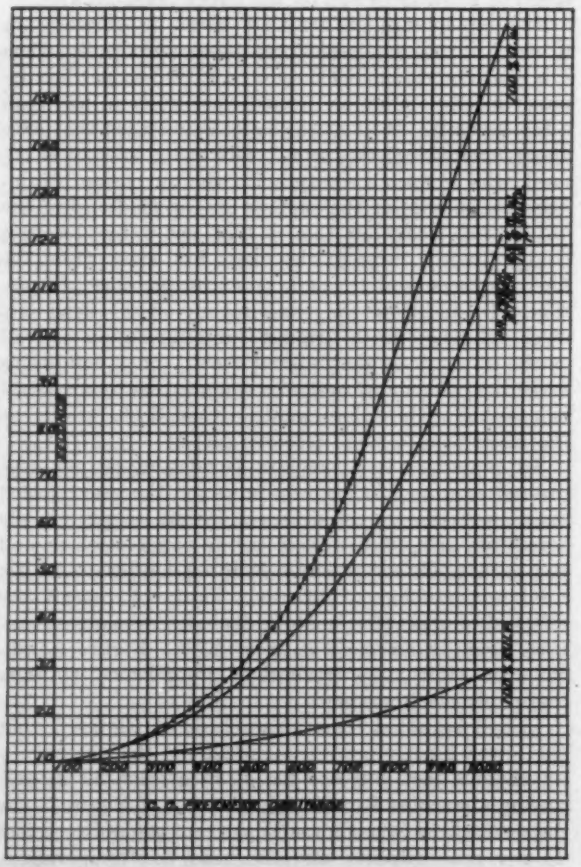


Fig. 2—Multi-stage freeness of groundwood and paper machine stock head box temp. 76 deg. Fahr. 100 per cent sulphite stock unbeaten

the stock of Figure 3 at the 700 reading. However, at the 1000 reading, the end point, the Figure 2 stock is ten seconds freer. The Figure 2 stock will form a far closer sheet than the stock of Figure 3. At the same time, it will have a drainage range that will allow the water to be removed over the wire travel and the sheet to reach the first press with a proper moisture content. In fact, the Figure 2 stock will produce a much superior sheet than the Figure 3 stock.

A study of the three curves of Figure 4 will reveal what takes place when sulphite is added to groundwood, the groundwood and the sulphite stocks respectively having individually the same multi-stage freeness in each of the three tests. In one test, the sulphite portion of the stock constituted 15 per cent of the furnish; in the second, 25 per cent; and in the third, 35 per cent.

Typical freeness readings for stocks represented by the curves of Figure 4 might be tabulated as follows:

C. C. DRAINAGE	SECONDS		
	15% Sulphite	25% Sulphite	35% Sulphite
700	32	24	16
1000	96	60	36

It will be noted in this tabulation that the freeness differential at the 700 reading is constant. On the other hand, at the 1000 reading, the freeness is decreased in the 15 to 25 per cent sulphite range 3.6 seconds per per cent of added sulphite; and in the 25 to 35 per cent sulphite range 2.4 seconds per per cent of added sulphite—a fluctuation of 1.2 seconds in freeness per per cent of sulphite. This fluctuation is due primarily to the fact that when a sheet is brought in the range of higher sulphite contents it contains more

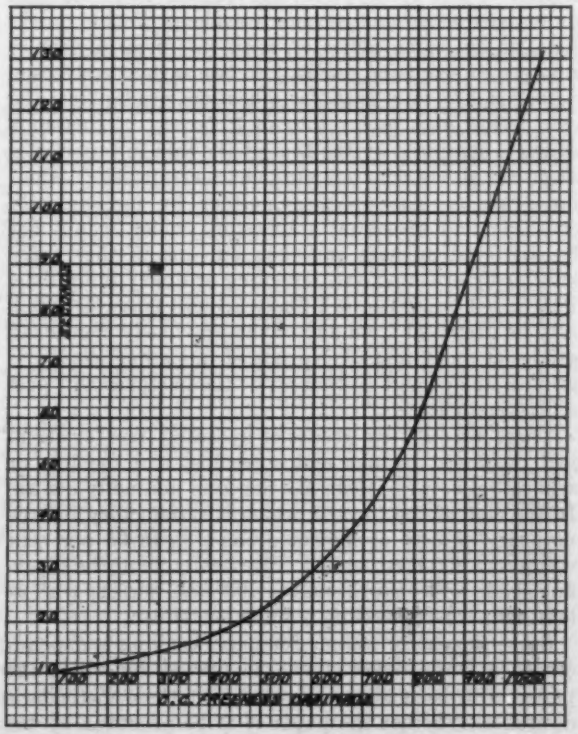


Fig. 3—Freeness drainage curve of high initial drainage stock

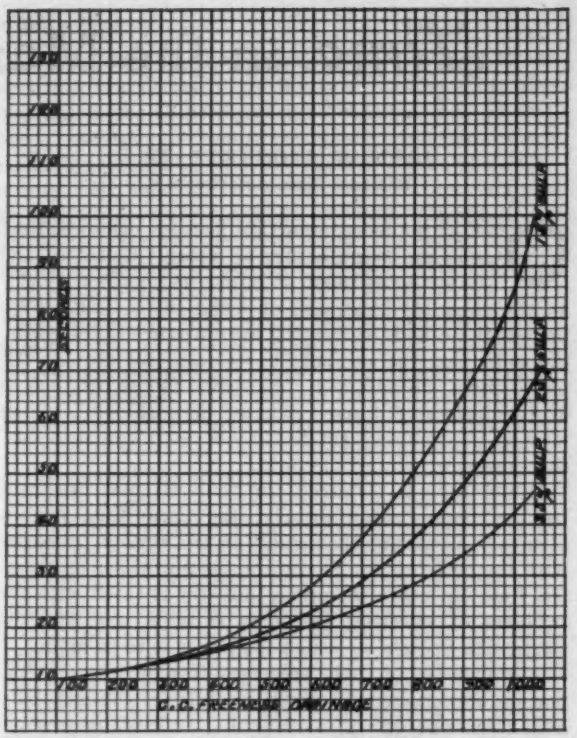


Fig. 4—Multi-stage freeness of paper machine stock using 15 per cent, 25 per cent and 35 per cent sulphite, balance groundwood

long fibers which have a higher drainage speed and a different formation cycle. Again it becomes a groundwood mill problem.

The grinding of wood to produce a grade of pulp with proper multi-stage freeness is not as complicated as it might appear. Attention, of course, must be given to pit temperature, stock consistence, pressure of grinding, and to asperities of stone surface. Likewise, in order to have quality formation, a high content groundwood sheet must be comprised of a certain percentage of long fibers and medium length fibers, and enough fines to close the sheet and act as a cementing agent to bond the sheet and give it the proper Mullen test value, the long groundwood fibers and the sulphite in turn establishing the tear value of the sheet.

The groundwood mill, therefore, should be set up to grind the pulp required, it being recognized that a combination of fibers cannot be ground with all stones dressed alike, and that the greatest variable is the raw material—wood. A skilled operator, taking freeness readings hourly of all stock passing through such a system, is in position to detect any change in the stock brought about by variations in wood or otherwise before it reaches the paper machine and to make such changes in operation as necessary to conform to the freeness standard set up for the operation.

The operation of this multi-stage method of freeness control is comparatively simple. A complete test does not require over five minutes. In fact, this method of stock testing is not limited to the newsprint industry but is applicable to various grades of both pulp and paper.

Lime in the Manufacture of Paper

JOHN W. STOCKETT, JR.
National Lime Association

ONE of the most important uses for chemical lime is in the manufacture of paper. Cellulose, the major constituent of paper, is obtained chiefly by the chemical treatment of wood chips. The three principal methods of treating the chips are the sulphite, the soda, and the sulphate processes. All require the use of lime. In addition, lime serves in the production of the bleaching liquor, calcium hypochlorite, which may be used subsequent to the above processes to further bleach or whiten the pulp.

While lime is required for four distinct purposes by the paper manufacturer, the same lime cannot always be used interchangeably in the various processes with the best results. Therefore, the purchaser of chemical lime for use in the paper industry is faced with the problem of selecting the most suitable lime for the particular process by which the paper is to be made.

A knowledge of these processes, in addition to information concerning the varieties of limes commercially available, is necessary in order that an intelligent selection can be made. The manufacturer of chemical lime, catering to the paper trade, also might be aided by a knowledge of these facts.

First, let us see what is meant by lime, and what varieties of lime are on the market.

Types of Lime

There are two types of lime: namely, quicklime and hydrated lime. According to definitions promulgated by the American Society for Testing Materials (A.S.T.M. Designation: C51-28), quicklime is "a calcined material, the major part of which is calcium oxide or calcium oxide in natural association with a lesser amount of magnesium oxide, capable of slaking with water." Hydrated lime is "a dry powder obtained by treating quicklime with water enough to satisfy its chemical affinity under the conditions of its hydration."

Classes of Lime

In view of these definitions, one might expect to encounter both quicklimes and hydrated limes containing various percentages of calcium and magnesium oxides. Such is the case. Limes are broadly classified as calcium or magnesium, depending on the content of these ingredients. When the percentage of calcium oxide is seventy-five or more the lime is termed calcium. On the other hand, if the magnesium oxide content is above twenty per cent, the term magnesium is used. There is such an abundance of good quality limestone throughout the United States that unless the stone is capable of yielding at least ninety-five per cent of combined oxides of calcium and magnesium, it is seldom used for the production of lime.

The chief impurities in lime are the oxides of silicon, iron, and aluminum. Sulphur, manganese, phosphorus, copper, sodium, and potasium are minor impurities occurring as traces and seldom exceeding one-half per cent in total amount. Practically all commercial limes contain a small quantity of carbon dioxide in the form of calcium carbonate due either to incomplete dissociation of the limestone in the kilns, or to recarbonation of the lime by contact with the atmosphere. An excessive amount of carbonate in the lime is objectionable more in the light of a diluent than as an impurity. For example, in the soda and sulphate processes, where the lime functions as a causticizing agent, the carbon dioxide not only acts as a diluent, but also renders an equivalent amount of the calcium oxide ineffective. On the other hand, the sulphur dioxide used in the sulphite process is capable of replacing carbon dioxide in combination with calcium oxide so that the amount of carbon dioxide present, unless in excessive amounts over five to seven per cent, is relatively unimportant.

Grades of Lime

We have seen that there are two types of lime: quicklime and hydrated lime, and that both types further may be classified broadly as calcium or magnesium. In addition, a further subdivision may be made, into grades depending upon the physical size of the particles. Grades of quicklime are lump, pebble, granular and pulverized. Lump quicklime, ranging in size from dust to pieces having an average diameter of approximately eight inches, is the grade most commonly known, probably due to the fact that it is the form in which lime was originally produced. In recent years, with the advent of the rotary kiln, the pebble, granular and pulverized sizes have become prevalent. Pebble quicklime, as the name indicates, is in the form of pebbles ranging in size from one-half to two inches in average diameter. The true granular quicklime results from the calcination in a rotary kiln of a variety of limestone which is shattered by the heat of the kiln into particles about the size of concrete sand or ice cream salt. A similar grade is also produced, either by mechanically crushing and screening a limestone which would not be shattered by heat and then burning in the rotary kiln, or by crushing and screening ordinary lump lime. Pulverized quicklime is a finely ground material which may be prepared from any of the previously mentioned grades of quicklime. This grade of quicklime usually is ground fine enough so that all of the particles will pass a fifty-mesh screen.

There are only two grades of hydrated lime for chemical purposes, regular and superfine, and the line of separation between them has not been distinctly drawn. In the case of the former, which is satisfactory for the majority of uses of hydrated lime, 85 to 95 per cent will pass a 200-mesh screen. Practically all of the superfine grade will pass through a 200-mesh screen, with at least 90 per cent passing a 230-mesh screen.

Since the choice of lime for paper-making is dependent to a large extent upon the process by which the paper is to be made, a knowledge of these methods is desirable. Whether the paper is to be produced by the soda, sulphate, or sulphite process, and then bleached with a calcium hypochlorite solution, the lime in each

instance first must be made into a water suspension commonly termed milk of lime. Any of the varieties of lime previously mentioned would serve this purpose. The choice of lime could be made solely upon an economic basis. Unfortunately, however, the preparation of a milk-of-lime suspension is the only essential step by which all of these processes are similar with respect to the use of lime.

Soda and Sulphate Processes

The soda and sulphate processes may be grouped as one in so far as the use of lime is concerned, since in both of these methods the lime serves as a causticizing agent. Caustic soda, sodium hydroxide, is the chemical actually used in the treatment of the wood by the soda process, and as will be shown later, caustic soda as well as sodium sulphide are the chemicals directly involved in the sulphate process.

The non-fibrous parts of the wood are rendered soluble upon digestion with caustic soda solution. The residual cellulose is then washed free of foreign materials and is ready for the next step in the manufacture of the paper. The lime has no direct action upon the wood. It serves only in converting soda ash into caustic soda. The reaction is identical for the soda or the sulphate process. $Na_2CO_3+CaO+H_2O=2NaOH+CaCO_3$.

The soda process derives its name from the fact that soda ash is used to make up the soda lost in the process, and the sulphate is so named by reason of the use of sodium sulphate or salt cake for make-up. In the recovery of soda from the spent liquor resulting from washing the digested cellulose or pulp, the liquor is first concentrated in multiple-effect evaporators and then burned in a rotary kiln. Most of the organic matter removed from the wood is eliminated by this combustion. In the soda process the final product from the kiln, known as "black ash," is a mixture of sodium carbonate, unburned carbon and incombustible mineral matter from the wood. The black ash is leached with water to recover the sodium carbonate. The solution then is brought up to strength by the addition of soda ash to compensate for the soda lost in the process, and then converted to caustic soda by the use of lime. The final stages in the recovery of soda in the sulphate process are slightly different. In this case, the black ash coming from the rotary kiln is mixed with sodium sulphate and sawdust. It is then burned in a smelting furnace where, by the proper introduction of air, the sodium sulphate is converted into sodium carbonate and sodium sulphide. Some sodium sulphate usually passes through the furnace without being reacted upon. The soluble sodium salts are recovered by leaching and then treated with lime which reacts only with the sodium carbonate converting it to caustic soda in accordance with the equation previously shown.

A calcium lime high in calcium oxide capable of reacting with soda ash is desirable for use in either the soda or sulphate processes. Carbon dioxide in the lime is objectionable since it renders an equivalent amount of calcium oxide inactive. The other ingredients ordinarily present in the lime, while not deleterious to the reaction involved, are objectionable as diluents. All grades of calcium quicklimes or calcium hydrates may be used for causticization purposes.

Sulphite Process

The treatment of wood chips by the sulphite process sometimes is referred to as the acid process, since the digestion of the chips is carried out under acid conditions in contradistinction to the alkaline treatment used in both the soda and sulphate processes. Here again the lime, as such, does not enter directly into the reaction. The chips are acted upon by calcium bisulphite, or calcium and magnesium bisulphites. The latter combination is preferred by most paper mill operators, due to the greater solubility and milder action of the magnesium bisulphite. It is claimed that a softer and better grade of pulp is obtained when a high percentage of magnesium bisulphite is present in the digesting liquor. The fibers are more easily washed free of foreign material and are not so readily encrusted with insoluble calcium salts when the ratio of magnesium to calcium is high in the cooking liquor.

While a magnesium lime is preferred for the preparation of the digesting liquor, either a calcium lime, a calcium limestone, or a dolomitic stone may be used. When limestone is used a calcium stone is generally selected, since magnesium carbonate is not readily acted upon in the formation of the bisulphite directly from dolomite.

No attempt will be made to compare the relative merits of the milk of lime system as against the tower system employing limestone. Good results may be obtained by either method.

The bisulphite or acid liquor used in the sulphite process is always prepared by the paper manufacturer. Sulphur and lime or limestone are the raw materials. The sulphur is burned in a furnace with a regulated supply of air. It is important in burning the sulphur that the supply of air be carefully controlled so that a maximum amount of sulphur dioxide is produced with the formation of as little sulphur trioxide as possible. Excess air also should be held to a minimum to prevent undue dilution of the sulphur dioxide formed in order that maximum efficiency in the absorption system may be obtained. The hot gases from the sulphur furnace are passed through a cooling system and then generated into a milk-of-lime suspension, or through wet limestone.

The insoluble monosulphites of calcium, or calcium and magnesium, are first formed by the action of the sulphur dioxide. The addition of more sulphur dioxide finally results in the formation of the soluble bisulphites.

$CaO+H_2O+SO_2=Ca(OH)HSO_3$ monocalcium sulphite

$MgO+H_2O+SO_2=Mg(OH)HSO_3$ monomagnesium sulphite

$Ca(OH)HSO_3+SO_2=Ca(HSO_3)_2$ calcium bisulphite

$Mg(OH)HSO_3+SO_2=Mg(HSO_3)_2$ magnesium bisulphite.

Although quicklime is usually preferred for the preparation of the bisulphite liquor by the milk of lime method, hydrated lime may also be used. Any of the grades of quicklime (lump, pebble, granular and pulverized) or hydrate (regular and superfine) are satisfactory.

According to specifications of the American Society for Testing Materials, (A.S.T.M. Designation: C46-27) lime for use in the sulphite process should be as follows:

"Either calcium or magnesium lime may be used, but owing to the greater solubility of the magnesium bisulphite, high magnesium lime gives the best results. The ratio of MgO to CaO shall be reasonable, constant and the lime shall be moderately free from impurities.

"The quicklime shall conform to the following requirements as to chemical composition, all percentages to be calculated on the basis of the weight of the sample taken at the point of manufacture:

	Calcium Lime		*Magnesium Lime*	
	Max.	Min.	Max.	Min.
Calcium oxide, per cent...	...	92.5	...	55.4
Magnesium oxide, per cent.	2.5	....	...	39.6
Oxides of silicon, iron and aluminum, per cent.....	3.0	....	3.0	....

"The chemical analysis of the lime shall be made in accordance with the Standard Methods of Analysis of Limestone, Quicklime and Hydrated Lime (A.S.T.M. Designation: C25) of the American Society for Testing Materials.

"The sampling, inspection, rejection, retesting, packing, and marking shall be conducted in accordance with the Standard Methods of Sampling, Inspection, Packing and Marking of Quicklime and Lime Products (A.S.T.M. Designation: C50) of the American Society for Testing Materials."

Bleaching Liquor

No matter how carefully made by either the soda, sulphate or sulphite process, wood pulp usually is contaminated with some lignin carried over from the wood. This lignin is associated with certain colored matter of highly complex chemical form. The action of the chemicals used in the digestion process often increases the intensity of this coloring matter. Therefore, if the pulp is to be used in the production of the better quality light colored paper, it should be bleached. Calcium hypochlorite is the chemical most frequently used for this purpose.

Until recent years calcium hypochlorite solution was prepared by the papermaker from bleaching powder, sometimes called chloride of lime or chlorinated lime. Bleaching powder was one of the chief by-products resulting from the manufacture of caustic soda by the electrolytic decomposition of brine. The chlorine evolved from the cells was absorbed by hydrated lime to prevent the escape of this poisonous gas into the atmosphere. With the development of suitable containers, chlorine was merchandised in liquid form. It now may be shipped safely and conveniently in containers ranging from 100-lb. capacity to tank cars carrying tons of the liquid under pressure. In view of the economy effected in the merchandising of chlorine in the liquid form, the importance of ordinary bleaching powder has diminished. Where formerly the producer of chlorine was an important consumer of lime, it now follows that the bleacher of materials, whether wood pulp, textiles or other goods, is a direct consumer of lime. The paper manufacturer who operates a bleaching plant in connection with the processing of the better grades of fine white paper should be concerned with the selection of lime best suited for the production of bleaching liquor.

The production of calcium hypochlorite bleaching solution is a comparatively simple operation. Chlorine gas is passed into a milk of lime suspension in accordance with the following reaction: $Ca(OH)_2+Cl_2=CaOCl_2+H_2O$. Considerable heat is generated in the chlorination process, and proper precaution must be taken not to allow the temperature to exceed 35° reg. C, otherwise the calcium hypochlorite may be decomposed. Calcium hypochlorite is a very unstable compound releasing the available chlorine most readily at elevated temperatures, under acid conditions, or when brought into contact with most organic materials, thus accounting for its property to act as a powerful oxidizing and bleaching agent. In practice, to prevent the too rapid decomposition of the calcium hypochlorite solution, a slight excess of lime should always be carried so that the solution will be kept alkaline. Usually about 1.25 lb. of hydrated lime or 0.9 lb. of quicklime are used for every pound of chlorine gas in the production of a reasonably stable calcium hypochlorite solution. The chlorine gas should be added slowly, and the mixture agitated to prevent the too rapid rise of temperature. In hot climates it is often necessary to resort to mechanical refrigeration to prevent decomposition of the bleach. When the requisite amount of chlorine has been added, agitation should be stopped and the sludge allowed to settle. The clear supernatant may then be drawn off, and is ready for use. The sludge should be washed at least twice with clear water to recover all of the hypochlorite solution.

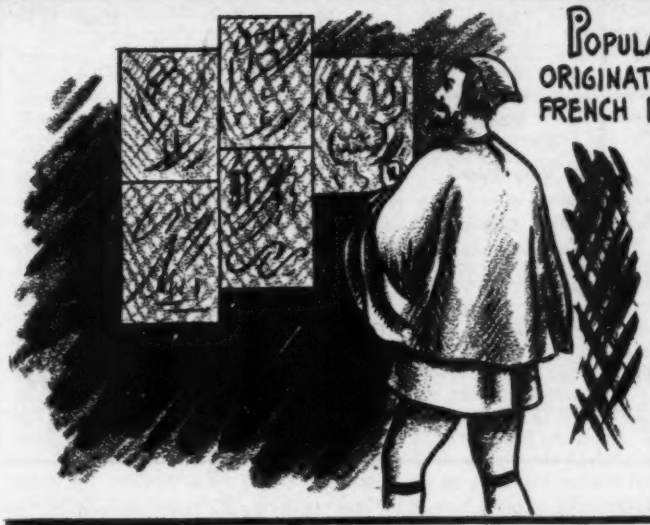
A calcium lime is required in the production of bleach solution. Either quicklime or hydrated lime may be used. The latter is sometimes preferred since the milk of lime suspension may be prepared cold, and no time is lost waiting for the heat to be dissipated resulting from the slaking of quicklime. Since calcium oxide is the only useful ingredient in lime for the preparation of bleach, it should constitute at least 90 per cent of quicklime or the equivalent 68.1 per cent in the case of hydrated lime. The magnesia content of the lime should be as low as possible since magnesia wastes chlorine by the formation of magnesium chloride, a stable compound not capable of releasing the chlorine for bleaching purposes. Iron, aluminum, and some forms of manganese are thought to hasten the decomposition of the bleach; hence limes containing unusual amounts of these ingredients should be avoided.

Summary

There are two types of lime, quicklime and hydrated lime, depending upon the degree of processing by the lime manufacturer. Based upon chemical composition, limes are broadly classified as calcium or magnesium. Quicklime may be graded as lump, pebble, granular or pulverized, according to the average size of the particles. In a similar manner regular and superfine grades of hydrated lime are available.

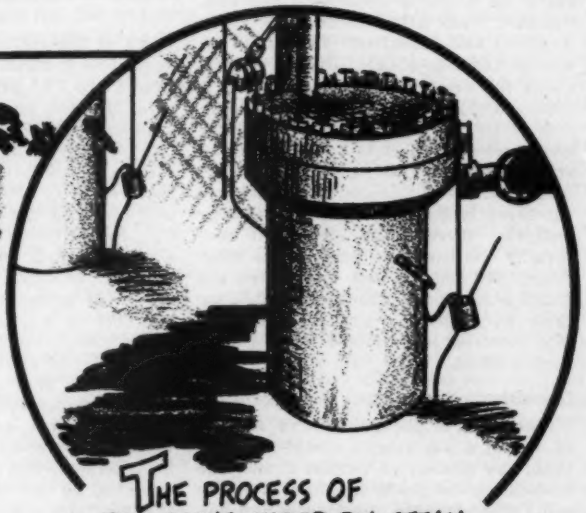
The class of lime most suitable for the manufacture of paper depends to a large extent upon the process used in producing the pulp. Whether for use in the soda, sulphate, sulphite or bleaching process, the lime must first be made into a milk of lime suspension; therefore, the grade or size of the lime particles as shipped is not of great importance.

Paper Sketches ---



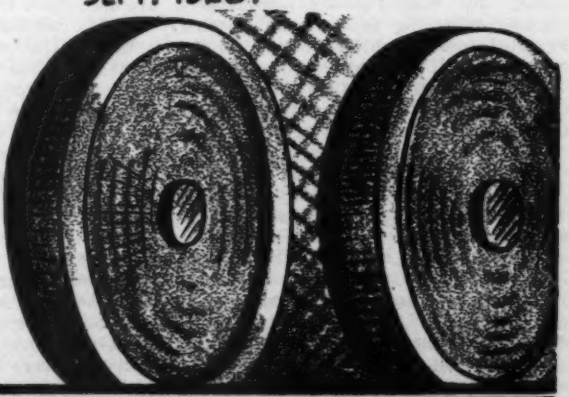
POPULAR USE OF WALL PAPER SEEMS TO HAVE ORIGINATED IN THE DESIRE OF 16TH CENTURY FRENCH PEASANTS TO IMITATE THE MURAL DECORATING EFFECT ACHIEVED BY THEIR NOBLE MASTERS THROUGH THE USE OF TAPESTRY HANGINGS. LACKING MACHINERY TO TURN OUT LONG STRIPS, MANUFACTURERS OF THE PERIOD MADE UP WALL PAPER IN SMALL SHEETS, BLOCK-PRINTED IT TO GET MARBLED AND DOMINOED EFFECTS, AND SOLD IT BY THE REAM.

SO SCARCE WAS PAPER DURING THE REVOLUTIONARY WAR, THAT ON AUGUST 14, 1776, CONGRESS EXEMPTED FROM MILITARY SERVICE THE MASTER WORKMAN AND TWO ATTENDANTS AT EACH PAPER MILL OPERATING AT THAT TIME.



THE PROCESS OF EXPLODING WOOD BY STEAM, DEVELOPED BY W. H. MASON, FOR USE IN THE MANUFACTURE OF INSULATION MATERIAL, WAS PLACED IN COMMERICAL OPERATION IN SEPT. 1926.

PAPER WAS USED IN THE MAKING OF WHEELS FOR RAILROADS DURING THE 1870'S. ALTHOUGH TIRES AND HUBS WERE OF METAL, THE WHEEL BODIES CONSISTED OF LAMINATIONS OF PAPER, HYDRAULICALLY COMPRESSED AND TURNED TO SHAPE.



Casein Glues

The comparative chart at the right is a summary of Mr. Holt's three articles on glues. The former articles, on the subjects of "Animal and Fish Glues" and "Starch and Dextrin Adhesives," appeared in the issues of September and October, respectively.

FRED HOLT, JR.
Technical Director
Brown-Bridge Mills

GENERAL COMPARISON OF STARCH, ANIMAL AND CASEIN GLUES

	Starch Glues	Animal Glues	Casein Glues
Cost	Low	Medium	High
Strength	Low	Very High	High
Water Resistance	Poor	Poor	High
Rate of Setting	Very Rapid	Rapid	Rapid
Spreading Power	Low	Medium	Very High
Viscosity	Thick to Thin	Thick to Thin	Medium
Foam	None	Very Low	Medium
Working Life	Days	Hours to Days	Hours to Days
Staining of Wood	None	None	High With Some Woods

CASEIN, like other adhesive materials from animal and vegetable sources, has been used for centuries. While it was not recognized necessarily as a single chemical compound, the curd from milk was used for years in paints and adhesives. In spite of its age of usefulness only little is known about the material as a chemical. Its complexity of structure and its nonuniformity from one sample to another have prevented chemists from arriving at but a few conclusions concerning the fundamentals of this material. At present there is no completely satisfactory analysis; there is no agreement concerning the causes of some of its reactions; and some of the users have not found a method of grading suitable for their purposes. So any discussion of this material is premised upon a very fragile basis.

Chemistry

Casein is a phospho-protein similar to, but of a much more complex nature than, the protein of animal glue. The molecule is composed of chains of amino acids and contains phosphorus and sulphur. The complexity of the molecule is indicated when it is realized that according to researches the molecular weight is at least 12,000 and is probably close to 200,000. Casein is amphoteric and can be dispersed in both acid or alkaline solutions. The acid dispersion is much different from the alkaline solution. The casein swells considerably before dissolving in the acid, forming casein chloride, sulphate, etc., as the case may be. It quickly forms caseinates with the alkali and alkaline earth metals. These are the solutions commonly used for adhesive purposes. It is insoluble in water, alcohol, and neutral organic solvents. It has been methylated, halogenated, nitrated and oxidized; these compounds being similar to casein, differing somewhat in solubility.

Manufacture

Casein is present in milk as calcium caseinate. It is a suspension in an aqueous solution of milk sugar (lactose) and mineral salts. There are microorganisms naturally present in milk which at 100 deg. Fahr. rapidly ferment the lactose to lactic acid and drop the pH from 6.5 to 4.6. pH 4.6 is the isoelectric point of casein and is the point at which it is least soluble. It will then precipitate forming the milk curd. Most of the curd is precipitated in this manner. It requires 12 to 18 hours, but there is no acid cost and the casein is of fine quality. Precipitation at a higher pH yields a gummy curd, hard to handle and of inferior quality. Precipitation at a lower pH includes other proteins present, making a lower quality curd.

The other methods of precipitation are by the use of dilute H_2SO_4, dilute HCl, or Rennet at higher temperatures. H_2SO_4 yields a higher viscosity casein than the lactic acid type, and HCl a still higher viscosity product. Mineral acids are difficult to wash out and are absorbed and adsorbed by the casein. This increases the ash and free acid content of the casein, lowering the grade.

Skim milk is poured into large, shallow vats holding 5,000 to 20,000 pounds. After the precipitation the whey is drawn off and utilized as a stock feed or for the lactic acid or albuminous content. This is a batch operation, and it is claimed that when mineral acids are used there is an uneven distribution of acid, causing curd precipitation at different pHs concentrations in different parts of the vat. This means that there are foreign proteins in the curd, gummy curd, and some curd that is just right. From this, it is easy to see why a variation occurs from one batch to another.

The washing must be thorough so as to remove as much of the free acid as possible. Caseins are desirable with a low free acid and low ash. The more acid the higher the ash will be. It has been found that mineral acids precipitate the curd in larger chunks which are more difficult to wash. This step must be done very carefully or the casein will be of very low grade.

After washing, the curd is formed into thin blocks and pressed in hydraulic or screw presses to about 30 to 40 per cent solids. After pressing, the blocks are milled for drying. A wet curd cannot be ground satisfactorily and tends to form lumps.

The ground casein is spread in a thin layer and dried on trays in tunnels. If it is lumpy, the inside of the lumps will remain wet and finally will deteriorate in storage. If the casein is not milled fine enough, the drying will require more time, which will cause discoloration and allow the free acid present to react with the casein. The temperature should not be over 130 deg. Fahr, or this will burn the curd.

The casein is finally ground to a powder and bagged. Grinding gives a more uniform size and lightens the color. The yield is about 3 per cent of the skim milk weight.

One must be careful as to the materials of construction used in the process. Copper, brass and aluminum are to be avoided. Wood, stoneware, chromium plated metals and bronze are being used successfully.

A new continuous process has been devised very recently for which is claimed a much more uniform casein with very low acid and ash. It is claimed to be quite superior to casein manufactured by any other process and it is sold at a premium.

Rennet casein is made almost exclusively for casein plastics. Here a high ash, low fat, high viscosity casein is desired.

Glues

The trade divides casein glues into two parts—wet and dry. The former are glues that must be compounded in the user's plant and cannot be shipped in a dry form from the glue company. The latter are dry ground mixtures of the ingredients of the glue formula to which the user has only to add the proper amount of water.

All casein glues are water resisting when compared with starch and animal glues. However, those which have a basis of calcium caseinate are much more water resisting than those composed of sodium caseinate, and shall be considered as a separate group.

In order to form a glue solution it is only necessary to have an alkaline water solvent. This can be done by dissolving an alkali such as NaOH or NH_4OH in the water or by dissolving an hydrolyzable salt such as trisodium phosphate, borax, sodium carbonate, etc., in water. The use of NaOH or NH_4OH immediately forces the user to compound his own glue because dry mixtures cannot be shipped with either of these ingredients. So the prepared glues are made up, using some salt such as borax as the alkali.

When the casein is dissolved, it should soak in part of the water to be added. After it has become thoroughly wet and the water has been absorbed by the particles, the alkali dissolved in the rest of the water is added. The soaking time depends on the size of the particles. Ten to fifteen minutes is usually sufficient for well ground casein. Larger particles require more time. If the casein has an excess of fines these will pack together and form lumps with dry undissolved casein inside. When the alkali is added these lumps will dissolve on the outside and form an impenetrable film around the undissolved casein.

If NaOH is used, a careful control of the solution should be kept. NaOH will darken the glue and decompose the casein if in excess. NH_4OH evaporates off and leaves an almost neutral glue. It makes a higher viscosity glue than do the other alkalies. Borax is not used if satin white is to be added. These two react, causing a thickening of the solution. Water-slaked lime is preferable to quicklime because of the heat given off by the latter. The amount to be used should be calculated on a basis of its $Ca(OH)_2$ content.

When the consumer prepares his own glue, it is essential that he measure carefully the ingredients of the formula. A small change in the amount of water or alkali will cause great differences in the viscosity and spreading power of the final solution. An increase in water will lower the viscosity and a decrease will raise the viscosity. An increase in alkali will lower the viscosity, raise the pH, speed up hydrolysis and decrease the strength of the glue. A decrease in viscosity generally will increase the working life. If a glue with high solids and low viscosity is desired, an increase in alkali is indicated. For a glue with low solids and ordinary viscosity an increase in the water content is needed. By varying the amounts of water and alkali it is possible to obtain within reasonable limits any solids content and viscosity desired.

If a salt is used as the dissolving agent, a small change in the amount will not cause nearly the change in viscosity and pH (due to the buffering action) as in the case of alkali. The substitution of one salt for another cannot be made freely. Certain salts have specific actions not exhibited by the others.

Casein in solution is subject to decomposition by hydrolysis and bacteria. It is possible to prevent the action of bacteria by adding a preservative such as B-napthol or one of the new synthetic preservatives. Hydrolysis occurs in solutions which have a pH of 11 or more. The higher the pH the faster the hydrolysis. Fortunately, the first few breakdowns of the molecule yield highly adhesive products so that only a hydrolysis quite well advanced is harmful to the glue. In order to keep the hydrolysis down, it is wise to use as little alkali as possible. The action is not so fast but what a glue two or three days old may be used. As long as the viscosity remains fairly constant, the glue will be all right.

The more highly water resistant glues depend on the formation of calcium caseinate and the adsorption of calcium for this property.

These glues are generally composed of a mixture of casein, calcium hydroxide, and a hydrolyzable salt. They can be shipped dry so that the user has only to add water. The viscosity is changed by increasing or decreasing the amount of water. These glues give strong joints and have excellent water resistance. The more water added the longer will be the working life of the glue. A glue can be made having a fairly high viscosity and a working life of 6 to 10 hours. There are a few salts which have been used in these glues that will change the viscosity without affecting the working life.

The use of silicate of soda in place of the hydrolyzable salt in these mixes makes a desirable, less alkaline, cheap glue with good strength and water resistance. Due to the presence of the colloidal silica, the working properties are considerably different from the other glues.

Casein has been made even more insoluble than the calcium caseinate by the use of ferric chloride, copper sulphate, lead acetate, zinc sulphate, etc., forming insoluble caseinates of these metals. The use of formaldehyde has been found to be the best method. It can be put on over the glue coat or used in very dilute form in the mix. Hexamethylenetetramine also has been used successfully.

Foam

One of the most common difficulties with casein glues is the presence of foam. It is known that agitation causes some of this, but there are other causes, at present unknown, which are far more responsible than agitation. It is a very difficult problem and there does not seem to be any possibility of a solution at this time. A few isolated results on foam studies have been well worked out. We know that the type of acid used in precipitation of the curd does not effect the foaming qualities. Blending caseins sometimes has yielded a combination with less foam than any of the constituents. Curds precipitated at lower temperatures foam more than those precipitated at high temperatures. The size of the particles has no effect. High fat content forms soaps with the alkali producing more foam. But when we learn that caseins treated exactly alike but from different cows give wide differences in foam index, we are lost again.

Testing and Grading Casein

There are quite a few tests in use for grading casein. Each man has his own particular group of tests which he believes from his experience, gives him the most information as to the quality of the material. There is no general agreement as to which tests form the best group and it is up to the user to decide for himself. Generally a group of both physical and chemical methods, made up from the following list, is used:

1—Viscosity	7—Odor
2—Solubility	8—Size
3—Strength	9—Cleanliness
4—Ash	10—Fat
5—pH	11—Foam
6—Color	12—Free Acid
	13—Moisture

The viscosity test is made on a standard casein—water—alkali mixture basis. This, of course, is very important as it shows the flowing ability and covering power of the casein. The viscosity will vary according to the process by which the casein was made, according to the pH, the free acid content, and the moisture content. If the viscosity of a freshly made glue is tested, it is possible by checking the viscosity as the glue ages to determine when the hydrolysis has reached a point where the glue is no longer good. As the casein hydrolyzes, the viscosity drops. Most caseins are very soluble so that rarely any trouble is encountered because of insoluble matter. Casein will mold in storage if the conditions are right and will form insoluble white flakes. If these are found the glue should be checked carefully for strength.

The woodworking industries use a glued joint test to determine the strength of a casein. Since the test is very high, about 2,000 to 2,500 pounds per square inch, it is made between two blocks of hard wood. This test requires very careful manipulation for reliable results. Many factors such as viscosity of the glue, temperature, pH, kind of wood, coat applied, penetration into wood, temperature of drying, time of drying, moisture content of the glue when tested, etc., affect the test. Papermakers generally spread casein glue-clay mixtures on paper and determine the lowest percentage of casein required for the coating to pull the fibers of the sheet. This also is affected by several factors, but by running a standard in conjunction with the sample it is possible to obtain good results.

The amount of ash indicates the effectiveness of the curd washing. In general, for the same type of casein, the lower the ash the greater the strength. Most users place a great deal of confidence in the ash test as it seems to vary inversely with some of the desirable properties.

The pH determination will indicate

the relative amount of alkali needed to dissolve the casein to a given pH. It will also indicate the type of curd since the properties of the curd will vary according to the pH at which it is precipitated. As was mentioned before, the isoelectric point of casein is 4.6 and it is desirable to obtain material with this pH. More acid caseins require more alkali for solution which adds to the cost and yields a lower grade glue. It also has been found that a small change in the casein pH has a much greater effect on the alkali requirement than the variation in free acid.

Casein should be cream colored to have an odor of sweet milk. Particle size affects the color of the dry material and it may be well to compare the color of a standard solution with a solution of the sample. Orange or brown spots indicate burning in the drying tunnel. A rancid odor shows decomposition —good casein has very little odor. It has been found that perfectly good caseins have picked up the odor of other materials when in storage but this has not lowered the quality of the casein. It is important to keep the casein clean. Dirt will cause spots in the film and may cause poor distribution and even decomposition of the glue. If a thin solution of the material is allowed to stand, the dirt will settle to the bottom or float and can be examined.

Fat determinations are almost unnecessary. The skim milk contains very little and it is not precipitated with the curd. Some, of course, is liable to be mechanically carried with the precipitation. Buttermilk is sometimes used and this has a little more fat. If there is too much fat in the glue it will form grease spots on the film. The fat also forms soaps with the alkali and foams.

Free acid is undesirable and should be titrated for.

The foamy quality of the glue is generally tested in homemade apparatus. Some tests measure the height of the foam after whipping the glue. Some tests determine the amount gravimetrically.

Applications in the Paper Industry

Coating paper consumes about three-quarters of the casein produced. It is evident then that this application is an extremely important one. A small amount of casein has been used in the beater. It is precipitated by the alum, of course, and gives more rattle and snap to a sheet, and cuts down the fuzz. It does not appear to have any effect on the retention of the filler. It acts as a fine dispersing agent for rosin and a little will increase the size test tremendously. When used as a top size, it was found that the acidity of the paper continually entering the bath gradually acidified the casein solution until the casein began to precipitate out. Although casein showed some improvements in the sheet it has not been used much because the same results can be obtained much cheaper with other materials—notably, starches.

As stated before, the great application has been for coating paper. Starch and animal glue could be used for this purpose if handled properly, but the coating men had so much trouble with these that they have stuck to casein. Casein also has the natural advantage of being somewhat water resistant.

The caseins used by the coating man are lactic acid precipitated since these form thin solutions, with little foam, and give good spread. Too much fat will form grease spots in the film. High foam will cause poor distribution.

It has been found that an analysis of the casein itself will not necessarily indicate the action of the casein in the coating mix. The addition of the clay and especially satin white causes changes that are many times unpredictable. The coating man really should make tests of the casein in a coating mixture and not place too much reliance on the test of the casein by itself.

Other Applications

Molded casein materials are very common. Fountain pens, toilet articles, buttons, and many other articles made of this material are in daily use. Casein is found in many paints, in imitation leather, soap, linoleum and innumerable other products, but paper coating uses by far the largest part produced.

◆ ◆

Power Plant Painting and Illumination

R. H. BACON

One feature of power plant design that has been given insufficient attention is the question of proper painting of walls, ceilings, and mechanical equipment. No matter how carefully designed a lighting system may be as to type, size of lamps, reflectors, etc., if the surroundings are not adapted to reflect such light as strikes them, the effect of the lighting system will be lost.

Now, it is not only true that little attention has been given to proper painting in power plants, but the lighting systems themselves as a rule are hopelessly inadequate. The combined effect of these two conditions has made many an otherwise fine plant, a place of gloom and darkness.

Ceiling and wall surfaces in a room are secondary sources of illumination—receiving and reflecting light from lamps —and in many cases merely increasing the reflection coefficient of the ceiling a slight amount, will greatly increase the effective illumination. It is important therefore to paint the ceiling as light a color as possible.

In basements and on condenser floors particularly, every effort should be made to obtain high coefficients of reflection from all surfaces. This applies not only to the walls and ceilings but also to the equipment itself. This, of course, does not mean that the coal handling equipment should be painted white or even the boiler feed pumps, but it does mean that such equipment can be painted some color other than black or dark brown.

Such equipment painted a medium green or a light gray will not only present a better appearance but will reflect the light and diffuse it in all directions, making all parts clearly visible. It is an easy matter to light mechanical equipment if the component parts assist rather than repel the light.

There is absolutely no reason why all machinery should be painted black as is the case in many plants. Black absorbs all of the incident light and produces extremely low visibility. One frequently visits industrial plants where in the factory buildings everything is light and airy, yet a visit to the power plant reveals pump rooms, condenser floors, and even engine rooms which are little better than dungeons, so far as brightness is concerned.

A bright plant is a cheerful and pleasant place in which to work and there is a natural tendency to keep light colored objects clean. A clean, bright work place has a decided effect in improving the morale of the employees. It is human nature to neglect apparatus which is installed in places where it can scarcely be seen because of the gloom which prevails. There is no incentive on the attendant's part to keep such equipment clean and furthermore, if something goes wrong he does not always detect it until the trouble has become so serious as to result in actual breakage and shutdown.

Place a machine in a light colored room, paint it a light color and there will be little danger of trouble existing for any length of time without being noticed. The attendant will unconsciously keep such a machine clean without apparent effort on his part.

It is agreed, of course, that a coat of paint will materially lengthen the life of most equipment, at least it will preserve it in better condition during its life. If that is the case, then why not put the paint to double use by using light colors? White, no doubt, would be preferred in any case, considered from the reflective standpoint, but this is not always feasible. Various shades of gray on the other hand, can be applied to almost any type of equipment with excellent results.

It is true that light colored surfaces will require more frequent cleaning and that this will add somewhat to the cost of maintenance. This increased cost, due to cleaning, however, will be met by lower lighting bills, decreased repair costs, a smaller labor turnover and fewer accidents. The psychological effect of gloomy interiors is well recognized and it is desirable in all cases to keep the employees in a cheerful frame of mind. This will have a direct effect in reducing the labor turnover.

The question of proper painting of interiors has been given considerable attention by various industries and as a result of a campaign of education on the part of certain paint manufacturers, the industries now realize that natural light is greatly aided if the interior surfaces are light in color. The power plant is no different from the factory as a whole in this respect, and the results attainable are equally as important.

Paulson Process for Spent Sulphite Liquor Utilization*

SIDNEY D. WELLS
Chemical Engineer and Paper Technologist

UNTIL recently it has been thought unwise to burn waste sulphite liquor in furnaces under standard boilers on account of the corrosive action of the sulphur dioxide in the flue gases. The dew point of sulphuric acid under the conditions of combustion, however, is well below 400 deg. Fahr.[1] and no corrosion from sulphuric acid is possible with flue gas above that temperature. This fact has been demonstrated amply by over two years experience[2] in the generation of steam with gases testing as high as 20 per cent sulphur dioxide as well as from gases quite high in sulphur dioxide and moisture in sulphate liquor recovery. At the same time, many common fuels, such as coal and oil, often contain relatively large amounts of sulphur and are burned under suitable conditions without corrosion from contact with the boiler surfaces.

An analysis of the Paulson Process[3] for the evaporation and combustion of waste sulphite liquor was presented by H. S. Kimball[4] in February, 1933, at the annual meeting of the Technical Association of the Pulp and Paper Industry. The conditions contemplated at that time showed that more than enough heat was available in the liquor to supply the steam for the evaporation of the liquor and the cooking, and that the necessary plant would pay for itself from the coal saved in steam generation. Experience since then has shown that some of the objections brought out in the discussion of the paper are unfounded and that later modifications and improvements in the process make it possible for a mill to manufacture and dry sulphite pulp without depending on any substantial source of fuel other than the lignin removed from the wood in the cooking process.

The two outstanding refinements and improvements introduced into the process since the original work of Paulson include the use of indirect heat for pulping and screw presses for the removal of the liquor from the pulp. The use of indirect heat in the digestion operation makes possible the use of steam at 55 pounds absolute pressure for cooking and the use of the condensate for part of the heating of the spent sulphite liquor. The use of two screw presses in series to remove the liquor from the pulp taken from the blow pits without dilution and the return of the effluent from the second press to the acid system eliminates all waste from the sewers except the 5.4 per cent of the total soluble solids which occurs in the pulp delivered from the second screw press.

Heat exchangers and indirect heating for pulping also make possible the use of smaller evaporators and a boiler pressure of 165 pounds absolute instead of 195 pounds absolute, which was considered necessary at the time that the use of the Paulson system in direct cooking was contemplated. This lower boiler pressure permits the system to be used in practically every sulphite mill without any modifications of the existing boiler plant.

The use of acid resisting steel in the fabrication of the worm screw of a screw press and the protection of the rest of the press from corrosion has made feasible the use of such equipment in this process. Other improvements in press construction also have been made. These improvements permit a press to operate continuously and to deliver pulp at between 40 and 50 per cent air dry basis.

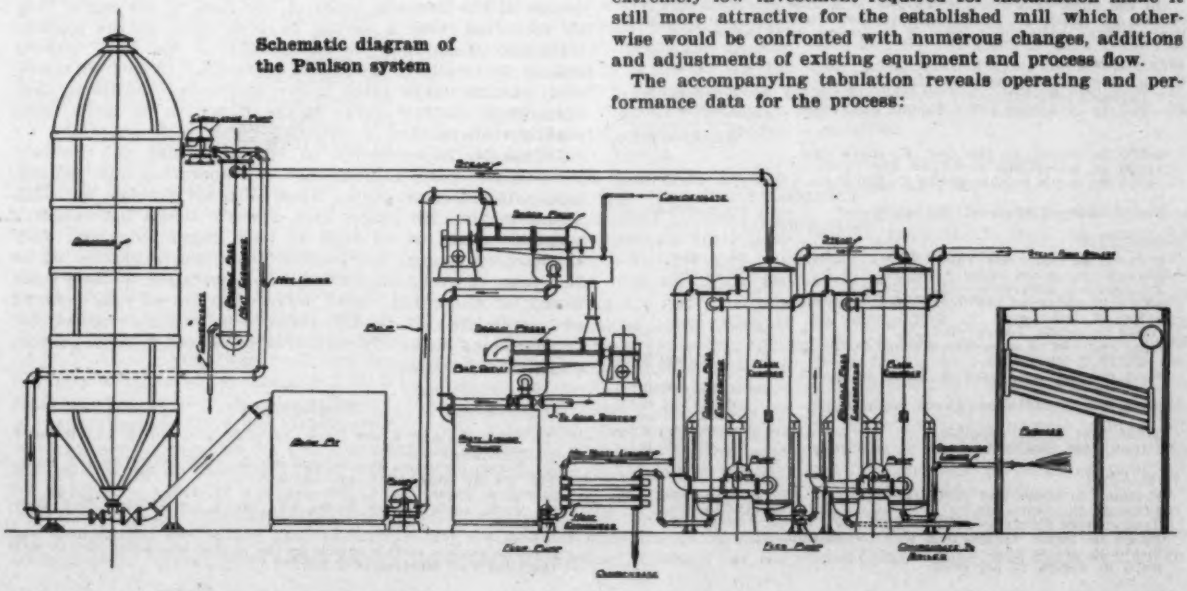
The return of the effluent from the second press makes possible all the advantages claimed from the return of soluble solids in digester liquor relief, and, furthermore, the removal of 94.6 per cent of the soluble solids from the pulp without causing any dilution of the liquor.

In considering the Paulson system, a question is apt to arise as to its merits compared with multiple effect evaporation for concentration without any connection with steam used for cooking. Theoretically, equal advantages are possible through the use of extraction turbines and the bleeding of steam for cooking and evaporation without any direct tie-up between the two. As a practical consideration, however, waste sulphite liquor is subject to abominable foaming at low pressures and concentrations. The viscosity of the concentrated liquor also is very much reduced by operation at the temperatures attending the higher pressures. The combination of all of the factors used in the Paulson Process eliminates trouble from foaming and circulation.

The factors upon which the Paulson Process is based have been ascertained by numerous authorities from experience in many sulphite mills and by some very exhaustive work under the direction of Paulson on mill scale and semi-mill scale runs.

The greater simplicity of the Paulson Process and the extremely low investment required for installation make it still more attractive for the established mill which otherwise would be confronted with numerous changes, additions and adjustments of existing equipment and process flow.

The accompanying tabulation reveals operating and performance data for the process:



Schematic diagram of the Paulson system

OPERATING DATA

Solids in liquor from one ton (air dry basis) of general utility, easy bleaching sulphite pulp	2300 pounds
Water in liquor from digester, indirect cooking, at end of cook using wood under extreme conditions of moisture	15300 pounds
Fuel value of 1 pound of solids in waste sulphite liquor	8000 B.t.u.
Coefficient of heat transmission, circulating liquor between 9 and 10 ft. per sec.	
Containing 20 to 25 per cent solids under conditions of second effect	650 B.t.u. per sq. ft. per deg. F.
Containing 50 to 57 per cent solids under conditions of first effect	330 B.t.u. per sq. ft. per deg. F.
Heating Surface proposed for each heater handling the liquor from a 100 ton pulp mill	2000 sq. ft.
Steam at 55 lbs. absolute pressure required to cook one ton of pulp by indirect cooking	5000 pounds
Temperature of liquor in storage	180 deg. F.
Specific heat of liquor containing 15% solids	.925
Specific heat of liquor containing 23% solids	.885
Temperature of condensate leaving liquor heater	190 deg. F.
Rise of boiling point of liquor 23% solids	1 deg. F.
Rise of boiling point of liquor 57% solids	4 deg. F.
Flue gas temperature	500 deg. F.
Power necessary for screw presses and pumps for a production of 100 tons of pulp per day	225 h.p.

PERFORMANCE DATA

The performance expected from each unit in the process is as follows:

Digester Blow

2300 lb. solids derived from wood, sulphur and lime for each ton of pulp produced.
420 lb. solids derived from dilute effluent from second press used in acid system.
2720 lb. total solids per ton pulp.
15300 lb. water in liquor (under extreme condition of moisture in chips).
2000 lb. pulp.

First Screw Press

2175 lb. solids from above delivered to waste liquor storage dissolved in
12300 lb. water.

Second Screw Press

2000 lb. pulp from first press carrying
3000 lb. water and
545 lb. solids with
12300 lb. condensate from digester heat exchanger and heater on second effect thoroughly mixed on way to second press which delivered
420 lb. solids dissolved in
12300 lb. water to acid system and
2000 lb. of pulp with
125 lb. solids dissolved in
3000 lb. water to wet machines or deckers.

Removal of solids from spent liquor ..... 94.6 per cent

On the basis of a 100-ton sulphite pulp mill producing 4.17 tons of pulp per hour, the expected hourly performance of the subsequent heating, evaporating and burning equipment is as follows:

Liquor Heater

Heat available in condensate from	
Digester heat exchanger 20,850 (256-158)	2,043,000 B.t.u.
Heater on second effect 23,600 (282-158)	2,926,000 B.t.u.
	4,969,000 B.t.u.

60370 lb. liquor at 180 deg. F. containing
51300 lb. water and
9070 lb. solids require 60370 X .925 B.t.u. per degree rise in temp.

$$\text{Temperature of liquor leaving heater} = \frac{4{,}969{,}000}{60370 \times .925} + 180 = 269 \text{ deg. F.}$$

Second Effect

Pressure in liquor and vapor space	55 lb. abs.
Pressure in steam space	80 lb. abs.
Temperature difference—312—(287+1)	24 deg. F.
60370 lb. liquor at 269 deg. F. fed, containing	
51300 lb. water and	
9070 lb. solids, 15 per cent.	
Heat required to raise temperature to 288 deg. F.	
60370 X 19 X .925	1,061,000 B.t.u.
Heat required to evaporate 20850 lb. steam	
20,850 X 919	19,161,000 B.t.u.
Heat lost by radiation, gases, etc.	1,040,000 B.t.u.
Total heat to be supplied	21,262,000 B.t.u.
Latent heat 23,620 lb. steam at 80 lb. abs.	21,262,000 B.t.u.

First Effect

Pressure in liquor and vapor space	80 lb. abs.
Pressure in steam space	165 lb. abs.
Temperature difference—366—(312 + 4)	50 deg. F.
39520 lb. liquor at 288 deg. Fahr. containing	
30450 lb. water and	
9070 lb. solids, 23 per cent.	
Heat required to raise temperature to 316 deg. F.	
39,520 X 28 X .885	979,000 B.t.u.
Heat required to evaporate 23,620 lb. steam	
(23,620 X 900) =	21,262,000 B.t.u.
Heat lost by radiation, etc.	1,400,000 B.t.u.
Total heat to be supplied	23,641,000 B.t.u.
Latent heat 27,592 lb. steam at 165 lb. abs.	23,641,000 B.t.u.

Furnace Under the Boiler

15900 lb. concentrated liquor containing
6830 lb. water and
9070 lb. solids, 57 per cent. Temperature 316 deg. F.
Factors for heat balance taken from Kimball's article.

Heat from burning 9070 lb. solids	72,560,000 B.t.u.
Heat in air for combustion	778,000 B.t.u.
	73,338,000 B.t.u.
Heat lost from evaporating 6107 lb. water remaining after first flash—6107 X 970.4	5,923,000 B.t.u.
Heat lost from superheating 6830 lb. water vapor from 212 to 500 deg. F.—6830 X 288 X .469	925,000 B.t.u.
Flue gas losses from combustion of solids in liquor	14,180,000 B.t.u.
Loss in ash $\frac{1.5 \times 72{,}560{,}000}{100}$	1,088,000 B.t.u.
Loss from radiation	1,566,000 B.t.u.
Total losses	23,682,000 B.t.u.
Ratio of Loss $\frac{23{,}682{,}000 - 778{,}000}{72{,}560{,}000}$	31.6%

Steam Boiler

Heat supplied by furnace to water in boiler	49,656,000 B.t.u.
Heat necessary to furnish 27,520 lb. steam at 165 lb. abs. used for evaporation and cooking	23,641,000 B.t.u.
Heat available for other purposes	26,015,000 B.t.u.

Boiler capacity required for evaporation and cooking

$$\frac{23{,}641{,}000}{970.4 \times 34.5} = 706 \text{ Boiler Horse Power}$$

Boiler capacity available for other purposes

$$\frac{26{,}015{,}000}{970.4 \times 34.5} = 777 \text{ Boiler Horse Power}$$

From the preceding data it may be stated that the theoretical mechanical power available, bleeding the steam from a steam turbine for the drying of pulp, is 1,000 Kw.

The performance which has been indicated is based upon operation with excessive moisture in the chips. Ordinarily, in using the Paulson Process there would not be sufficient water in the waste liquor to furnish the steam needed for cooking. This deficiency, however, can be met by taking from the second screw press the amount of effluent required to maintain a proper balance.

It should be mentioned that acid resistant steel is used for the digester heat exchanger, the liquor heater and the tubes and exposed surfaces of the second effect, while the ordinary steel and iron is used for the first effect since acid conditions are not present after the second effect.

The total power available, 1,483 boiler horsepower, is ample to supply the needs of the pulp mill even to the drying of the pulp. Auxiliary fuel is doubtless desirable, but, with coal costing $5.00 per ton delivered at the bunkers, a saving of over $300.00 per day is indicated. In addition, by proper design of the furnace, much of the lime in the liquor may be recovered with a saving in proportion to the amount collected. Soda may be substituted as the base without adding materially to the cost of operation. In such an operation burning takes place under oxidizing conditions, thus permitting the fuel value of the liquor to be much more readily realized than in sulphate liquor recovery.

It hardly is necessary to comment that the Paulson Process for spent sulphite liquor evaporation and combustion puts the entire waste liquor disposal problem on a different status. No longer is it a waste liquor but rather a possible source of revenue of such magnitude that very satisfactory returns are possible from the realization of its fuel value in every sulphite mill now operating without some means of utilization. With definite revival of pulp demand and availability of capital, there is no adequate reason for further delay in the elimination of one of the greatest sources of industrial waste.

Bibliography

(1) Browning and Kress, *Tech. Ass'n Papers*, Series XVIII, No. 1, June, 1935, pp. 213-225.
(2) Kress, Swanson, Porter, and Smith, *Tech. Ass'n Papers*, Series XVIII, No. 1, June, 1935, pp. 545-548.
(3) U. S. Patent No. 1, 393, 241, Oct. 11, 1921.
(4) *Tech. Ass'n Papers*, Series XVI, No. 1, pp. 198-200, New York, June, 1933.

(*) The subject of this article by the author was presented by title at the 1935 Fall Meeting of T.A.P.P.I.

Special Meeting of the A. P. & P. A.

Officials meet to discuss vital and pressing problems of the industry

THE American Paper and Pulp Association convened on the afternoon of November 20, 1935 in the Tower Room of the Drake Hotel, Chicago, for a special and yet open meeting. The meeting was called to order by Frank J. Sensenbrenner, President of the Association as well as of the Kimberly-Clark Corporation. With him at the speakers' table were Carl E. Whitney, Counsel for the Association; D. C. Everest, Vice President and General Manager of Marathon Paper Mills Co.; Charles W. Boyce, Executive Secretary of the Association; and Ernst Mahler, Vice President of Kimberly-Clark Corporation and Chairman of the Central Grading Committee.

In his opening remarks Mr. Sensenbrenner stated that the principal purpose of the meeting was to discuss some legislative and other matters that have far reaching effect upon future progress and also on which the industry is being called upon to take positions. He made it clear that those individuals who are guiding the affairs of the Association wanted suggestions and constructive advice.

The effective work of the Committee on Public Affairs, a committee headed by Norman W. Wilson and assisted by Attorney Whitney and Secretary Boyce, and organized for handling certain phases of co-operative work in industry common to all manufacturers and all divisional associations, was mentioned. He cited the Crossett case; gave the modus operandi for getting the facts to the Board of the R. F. C.; and suggested that he thought it safe to say that in the future the R. F. C. will not act without fullest information.

President Sensenbrenner Addresses Meeting

The attitude of the industry in respect to the conference called by Major Berry for December 9 in Washington was cited by Mr. Sensenbrenner as the most important question of the day before the industry. He stated that conditions in the industry did improve under the N. R. A. and questioned "What shall be the next step?"

Briefly, Mr. Sensenbrenner then mentioned the large excess of productive capacity in every papermaking country of the world; suggested that the domestic industry might well be ruined if tariff protection for the industry is removed or substantially reduced; and recalled the treaties that ended the war of 1812 which most seriously affected the industry which was then struggling for a foothold, the number of manufacturers of paper between 1810 and 1820 being reduced almost one-half in the United States and their business taken over by imports.

The voice of the individual, continued Mr. Sensenbrenner, is not loud enough to be heard. He suggested action as an industry to preserve what has been built up and to improve on accomplishments.

F. J. Sensenbrenner, president of the Association

Operating volume for the industry in October 1935 was said to average 75.8 per cent of capacity. This figure was contrasted with a figure of 64.7 per cent for a year ago. Today's prices were stated to be about the same as last year; but monthly earnings, as a result of more allowable working time and wage increases combined, have increased 10 per cent over those of corresponding periods of last year.

Mr. Sensenbrenner remarked that price cutting is still known to exist in the industry. On the other hand he said that there are many manufacturers who desire to increase prices and that ultimately the law of supply and demand will react in regard to them. In his opinion, the industry is approaching a point where something must be done—with its price cutting, inefficient production and inefficient selling.

In continuing his comments, Mr. Sensenbrenner intimated that manufacturers' confidence in their industry and in their ability to maintain their positions is returning. Furthermore, he ventured to assert that this year the industry is spending for improvements in production facilities more than it has in the last three years—expenditures which may amount to as much as $40,000,000 in the industry as a whole. At the same time, in concluding his remarks, he inferred that the industry as a whole is still behind its improvement program perhaps as much as $100,000,000.

The remarks by Mr. Sensenbrenner were received most enthusiastically.

Following their presentation he called upon Carl E. Whitney, Counsel for the Association, in the absence of Norman W. Wilson, to tell of the work of the Committee on Pubic Affairs.

Association Legislative Activities Discussed

Mr. Whitney mentioned early in his remarks that he had never worked in any field where he had such support as that given him by the industry. He paid tribute to the work of the import committee and then pictured some of the work which has been done by the Committee on Public Affairs during the last year.

In this latter connection, he said that 2,000 of the approximately 14,000 bills which were introduced at the last session of Congress passed over the desks of this committee and that 50 of them required active work on the part of the committee. He made it clear that the Association maintained no lobby in Washington; and placed emphasis upon the need for the industry to be alive to the legislative situation and about the bills to be introduced. Some men out in the mills, commented Mr. Whitney, do not know what is being done for them through association activities.

Mr. Whitney also suggested that pulp and paper manufacturers should know their Senators and Congressmen; and that these men should be made acquainted with the importance of the industry in their respective districts. He cited definite experiences to prove the practicality of these contacts and asked for a showing of hands of those in attendance who knew their representatives in Congress. The result was gratifying to him. He said that it averaged higher than usual for business groups.

The comments by Mr. Whitney were followed by the reading of a report on the Reciprocal Trade Agreement Act. This report was read by Charles W. Boyce, Executive Secretary of the Association.

Secretary Boyce Reports on Trade Agreement

The Swedish Trade Agreement, it was stated, reduced the rate on wrapping paper 5 per cent with the result that imports in August, the first month in which the agreement was in effect, were equal to one-quarter of those for the entire year of 1934, and at a delivered price below that at any American mill. Rather extensive comments also were made on the Cuban Reciprocal Trade Agreement. In these comments it was pointed out that importers of various commodities are claiming in a series of cases before the United States Customs Courts that products of all other nations are entitled to the concessions granted imports from Cuba. Paper manufacturers, never-

theless, were said to be contesting this claim in all cases involving imports of paper, such cases including shipments from Japan, China, Scandinavia and many other European countries.

Washington Conference Representation

Following the reading of the report relative to the Reciprocal Agreement Act, Mr. Sensenbrenner introduced D. C. Everest as a member of the Executive Committee of the Association, who presented some interesting and timely facts relative to the industry and Major Berry's Washington conference of December 9. A resolution providing for the acceptance of the invitation from Major Berry to this conference was presented by Mr. Everest for consideration at the meeting. It received unanimous approval and insured representation for the pulp and paper industry at the conference.

Work of Grading Committee

The last formal presentation of the afternoon session was made by Ernst Mahler on the work of the Central Grading Committee, of which he is Chairman. He listed twenty-three fundamental properties of a sheet of paper, among which were thickness, weight, density, expansion and contraction, formation, porosity, dielectric strength, thermal conductivity, reflectance, color, stretch, hardness, stiffness and tensile strength. Mr. Mahler then listed a number of evaluations of paper, properties which he stated are often considered as fundamental, but which result from a combination of two or more of the fundamental properties that had been previously mentioned by him. Among these evaluations were such properties as bulking, absorbency, degree of sizing, abrasiveness, finish, permeability of various liquids, bursting strength, folding strength, opacity, curling, fuzz, permanence, and others.

The paper industry, continued Mr. Mahler, must make major changes in its method of distribution if it is to keep abreast of other industries. He mentioned the increasing attempts of consumers of paper to set up their own specifications and suggested that it seemed necessary for protective purposes, if for no other reason, that the industry support a scientific study of properties and instruments.

According to Mr. Mahler, eleven instruments for measuring color, six for tensile strength, and four for smoothness are mentioned in a report to be released shortly by the American Paper & Pulp Association. Added confusion, he said, comes from consumers who have started to use their own pet instruments. The critical analysis of all of the instruments that exist and the precise determination of what each of these instruments measure and how they compare with each other, said Mr. Mahler, is one of the purposes of the work in addition to the work on grading. In the opinion of Mr. Mahler, classification of papers and a sound grading of structure can come only after the achievement of a scientific foundation to build upon. To this end, in concluding his remarks, he recommended that these studies must proceed from an industry-wide standpoint rather than as a sectional undertaking.

When national officers and directors of the American Pulp and Paper Mill Superintendents Association held a directors meeting in Buffalo recently, they were entertained in Niagara Falls by officers of the Carborundum Company and were guests of Francis Bowman, Advertising Manager of the company, at a broadcast of the Carborundum program, with Edward d'Anna and his 50-piece Carborundum Band. Bowman, who has been program director, announcer, continuity writer, and narrator of Indian folklore and legends on each of the Saturday night broadcasts since their inception ten years ago, is shown greeting the pulp and paper men above. The broadcasts are heard over the Columbia network from Niagara Falls. The picture shows, standing, left to right: H. E. Stowell, William MacGregor, W. W. Barrett, John J. Cornell, G. H. Dennison, Charles Champion, F. D. Bowman, Robert Emminger. Sitting, left to right: F. L. Zellers, B. Millidge, William Brydges, Fred Boyce.

Paper Sales Promotion Advocated

Following the remarks by Mr. Mahler, William Bond Wheelwright, Publisher and Editor of *Paper and Printing Digest*, questioned if there might be some way to increase the consumption of paper. He stated with some definiteness that the industry as a whole had taken little interest in co-operative effort to extend the uses of all kinds of paper. He mentioned the effort of the Direct Mail Advertisers' Association and expressed the thought that the Association merited the sympathy and support of the industry. Mention also was made of the work of the American Institute of Printing and of the influence of the various trade journals.

Mr. Wheelwright likewise cited the lack of interest on the part of the industry in supporting a paper exhibit at "A Century of Progress" and said that in spite of this lack of interest on the part of the industry, well over 5,000 people per day visited the exhibit that was made. The thought also was expressed by Mr. Wheelwright that the American Paper and Pulp Association possibly could co-operate in the sales promotion of paper.

Mr. Wheelwright's comments were followed by a question from Mr. Sensenbrenner relative to the value of the meeting in Chicago and if such open meetings should be held in the future at intervals of once or twice a year as seemed necessary. This question received most favorable response from the assembled membership.

An additional plea also was made from the floor to support more actively the work of the Direct Mail Advertisers' Association, it being pointed out that all advertising was hooked directly to the effort of salesmen and that the success of such advertising resulted in the use of more paper.

Information in answer to several questions of very pertinent interest was asked of Carl E. Whitney, the Association's Counsel, previous to the adjournment of a very enthusiastic and worthwhile open meeting of the American Paper and Pulp Association.

◆ ◆

◆ LEON M. DUNNING, formerly of the Cleveland office of the Reliance Electric & Engineering Co., manufacturer of electric motors, has been made manager for the New England district with offices at 89 Broad Street, Boston, Mass.

Demand for Paper Stronger Since Early Spring Lull

The information on this page is quoted from a survey of the paper industry recently published by DUN & BRADSTREET, INC.—*Editor's Note.*

THE contracted conditions which developed in the paper industry, following the peaks that were touched in 1929, evidently have been definitely arrested. Since the early summer of 1933 the trend, with some minor variations, has been consistently upward. While the second quarter of the current year was less satisfactory than the first one, due to adverse weather conditions, demand has been widening since July, giving some divisions of the trade the largest volume divisions of the trade the five years. Of special significance has been the broadening movement of higher-priced grades.

Distribution of paper during the first ten months of 1935 was larger by approximately 20 per cent than in 1934, with the gain representing tonnage moved, as prices practically were steady at last year's level. Profit margins, however, were narrowed by the rising production costs and the mounting tax payments. Both employment and pay rolls have been expanding during the year, as production has run ahead of that of 1934 by an average of 15 per cent, with the wrapping paper division exceeding the average. Production of newsprint definitely has turned upward, although at a slower rate.

It is the general consensus that next year will see at least a beginning toward the much-needed price increase in most divisions of the industry. Inventories already are being accumulated by wholesalers in anticipation of such advances. The new uses for paper and paper products, which constantly are being devised, together with the steadily-rising purchasing power, are being counted upon to strengthen conditions and to push the volume of sales more rapidly upward during 1936.

Production Above 1934

The recovery in orders for paper, which gathered momentum as the third quarter advanced, enabled most manufacturers to advance their schedules from the level that obtained during the second three months. By the end of October, mills were operating at an average of 75 per cent of capacity, with some of the kraft and board units at 85. This compared with an average of 65 per cent in 1934. Based on the orders already booked, manufacturers estimate output for 1935 at 8 to 15 per cent in excess of the 1934 total, with the gain in the wrapping paper division running to about 20 per cent.

While newsprint definitely is on the upgrade, the rise has been at a slow rate, with the chief support given by the Canadian mills. Output in the latter for October set an all-time high at 266,515 tons, exceeding the previous record reached in November, 1929, at 252,046 tons. While production in the United States in October rose to 79,746 tons from 71,416 in September, it was smaller than in October, 1934, by 826 tons. In spite of the October increase the ten-month total for the United States was under 1934 by 6.4 per cent.

The combined production of Canada and the United States for October, however, rose to 346,261 tons, the largest total for any month since May, 1930, when it was 355,774 tons. This brought the output for the ten months of 1935 up to 3,006,108 tons, which exceeded all comparative figures back to 1930. It was 6.1 per cent smaller than in the latter year, but 21.9 per cent larger than in 1932, and 24.5 and 2.7 per cent, respectively, above the 1933 and 1934 totals. From the peak year 1929, it was off 11.7 per cent.

Consumption Increasing

Improvement in general paper sales has been almost uninterrupted this year, despite the recession which occurred in some divisions during the second quarter. As a whole, sales for the ten months of 1935 exceeded those of the comparative 1934 period by 10 to 15 per cent, with the gain for the country ranging from 5 to 25 per cent. A number of concerns reported volume approaching the 1929 peak. The increase in unit turnover was larger than that in dollar volume, due to the steady price level.

To the higher rate of industrial operations, the widening retail distribution, and the increased outlays for advertising, the rising sales volume was attributed. Wrapping and package papers contributed heavily to the enlarged total, followed by bond, book, envelopes, bags, and builders' paper. Buying of Christmas requirements of wrapping paper, twine, bags, and set-up boxes has, in many instances run nearly to the proportions booked for the holiday season in 1929, with better qualities selected than in the last five years.

Price Structure Firmer

Manufacturers report prices steadier than at any time during the past five years, with firmness extending to nearly all grades. Wholesale prices, on the other hand, have been somewhat irregular, but there has been an absence of any wide fluctuation in the level, which is at about the same position obtaining at this time last year.

Quotations on both fine and coarse paper have been steady, with kraft and board strong, because of the small supply of raw materials. Competitive conditions have been largely responsible for the irregularities in fine and print papers and the weakness in sulphite bonds. In most branches upward revisions are expected early next year.

The price of newsprint has been unchanged at $40 a ton since April, 1933, when it was lowered from $45. Attempts to raise it by $2.50 a ton for the first half of 1935 were unsuccessful. For 1936 the price has been set at $41 a ton, even though Canadian mills had hoped to get from 42.50 to $45, as production costs have risen nearly $3 a ton.

Failure Total Larger

The increase in failures in the paper industry that was recorded during the opening months of the current year was extended in the Summer and early Fall. This brought the total for the ten months of 1935 to 39, in contrast to only 24 for the twelve months of 1934, which was the smallest number that has appeared in the tabulation since 1931.

Although no bankruptcies were reported for paper manufacturers since May, at the end of October the number stood at 9, which compared with 8 for the full year of 1934. The gain in the defaulted indebtedness was even wider, as the ten-month total rose to $1,012,529, from $892,529 for the twelve-month period of 1934.

It was the failures of wholesalers and retailers of paper that contributed the bulk of the increase thus far this year, the number for the ten months advancing to 30, which was nearly double the 1934 total and the largest since 1932, when the all-time high was reached at 35. The defaulted indebtedness for the period almost equalled that of 1933.

The complete insolvency record of the paper industry since 1927, including the ten months of 1935, as compiled by DUN & BRADSTREET, INC., shows:

Paper Manufacturers

Year	Number	Liabilities
1927	5	$2,017,000
1928	5	816,900
1929	10	1,929,200
1930	3	821,226
1931	1	800,000
1932	9	3,613,450
1933	10	1,944,189
1934	8	892,529
1935*	9	1,012,529

(*) January to October, inclusive.

These statistics of commercial failures are exclusive of applications under Section 77B. From June 7, 1934, when Section 77B of the New Bankruptcy Act became effective, to October 31, 1935, applications were filed under this section by 12 manufacturers in this industry and by no wholesalers or retailers.

◆ Pump for High Speeds and Heads

A non-clogging pump for handling pulpy materials or sewage at high speeds and against high heads, and which permits the use of standard high speed motors, has been developed by the Morris Machine Works, Baldwinsville, N. Y. The unit includes, as an exclusive feature, a floating suction ring which is designed so that solid particles will not interfere with its effectiveness as a seal between the suction and pressure parts —the impeller of each size passing solids up to 1 in. smaller size than the pump outlet. It also is self-contained with its heavy duty double ball radial and thrust bearings being supported on an extension of the hub disc.

The new pump is built in both vertical and horizontal designs, in sizes from 3 to 10 inches, and with open or enclosed impellers. Efficiencies above 85 per cent have been cited for it in several installations.

Further information regarding the pump may be obtained by addressing the manufacturer.

◆ Packless Expansion Joint

The American District Steam Company, North Tonawanda, N. Y., has patented and is placing on the market a new packless expansion joint, known as the U-Ring Type.

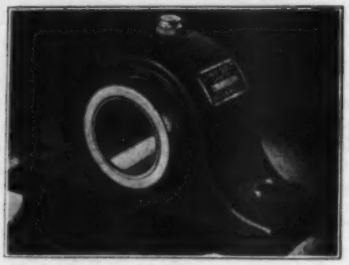
The joint is made with a wrought steel body which fully encloses the expansion element. The expansion element is a series of die-formed "U-Rings" of stainless steel alloy which are welded together without transverse seams. One end is welded to the wrought steel body of the joint and the opposite end is welded to a plate that is in turn welded to the sleeve.

The joint, stated to be especially desirable for underground pipe lines, power piping or inaccessible locations where space is limited, is available for pressures to 400 lbs. and temperatures to 800 deg. Fahr. with flanged ends or beveled ends for welding directly into the pipe line and with or without anchor base. It is installed with the expansion element compressed so that the element under actual operating conditions is in a neutral or normal position and is free from flexing strain when under maximum line pressure.

Control rings and stop-bolts distribute the expansion and contraction movement through the U-Rings. A normal range of traverse is one to eight inches, but any reasonable amount can be provided. The full amount is available as the element is under least flexing strain when the sleeve reaches its rated traverse.

◆ New Self-Aligning Roller Bearing Units

Announcement is made by the Link-Belt Company, Chicago, that it has developed a new line of bearing units. In this line, known as Link-Belt Shafer Self-Aligning Roller Bearing "Series 400," Shafer self-aligning double-row roller bearings are used in Link-Belt mountings. Self-alignment of the Shafer roller bearings is provided by concave rollers between convex outer races and a spherical inner race on the sleeve, which is free to deflect with a shaft temporarily misaligned or out of line because of inaccuracies of installation. Bores are ground for direct shaft application, and labyrinth seals protect the bearings. These units are available for pillow blocks, flange bearings, hangers and take-ups in popular standard sizes.



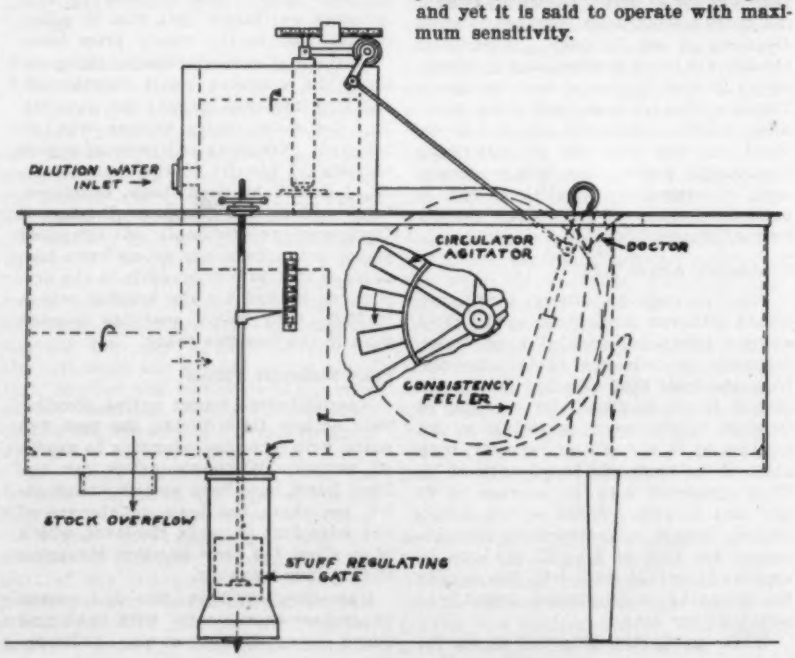
◆ Consistency and Weight Regulator

A new type of stock consistency and weight regulator is offered by the DeZurik Shower Company of Sartell, Minn.

The apparatus consists of a beater-like tub in which the stock is beaten constantly and circulated by a motor driven agitator. A feeler, suspended in the circulating stock and connected directly to a water dilution valve, is stated to correct instantly any changes in consistency by varying the volume of dilution water entering the stock mixture. A portion of the regulated stock passes out through a stuff gate built into the machine while the balance is re-circulated in the tub and thoroughly mixed with the raw incoming stock. This mixing of the raw with regulated stock is claimed to be an exclusive feature which insures accurate regulation because the variation in consistency of the mixture is reduced greatly before it reaches the feeler.

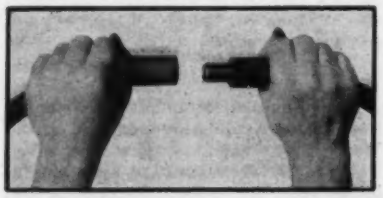
The machine is so arranged that a constant head of stock is circulated at all times.

The volume of raw stock entering the machine equals the volume leaving the stuff gate. Surplus stock returns to the storage chest without being diluted. The dilution water is kept at constant pressure by an overflow. The dilution valve is designed for easy operation and is balanced at all times, being especially designed to use white water and to close tightly. The machine, simple and dependable, avoids the use of delicate parts and yet it is said to operate with maximum sensitivity.



◆ Electrode or Welding Cable Connector

A new type of quick-detachable connector for use in connecting welding or electrode cable has been announced by The Lincoln Electric Company, Cleve-



land, Ohio. This connector, which locks in position and which, it is stated, cannot work loose or be accidentally pulled apart, is protected against grounding by fibre insulating sleeves.

◆ A. C. & D. C. Magnetic Contactors

The Electric Controller & Mfg. Co., Cleveland, Ohio, has developed and announced two new lines of magnetic contactors—one for a. c. and the other for d. c. applications.

The a. c. contactor, known as the LTZ Line-Arc contactor, utilizes contacts made of pure copper, bearings of Oilite, and contactor arms and armature housing of strong aluminum alloy. The unit is built in single, double and triple pole styles and in capacities of 100, 150 and 300 amperes.

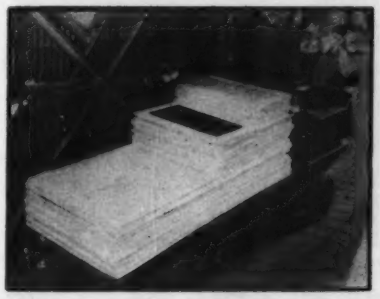
The direct current contactor, designated as Type LT, uses aluminum alloy for its moving parts, pure copper for contacts, and high permeability rolled steel parts in the magnetic circuit. It is built in 100, 150, 300, 600 and 800 ampere sizes—the No. 1, 2 and 3 sizes being available in single pole, double pole and spring-closed forms and the larger sizes in single pole style. Operating coils are designed for continuous operation on voltages of 230 volts or less.

◆ Goggle Lens with Greater Impact Resistance

The American Optical Co., Southbridge, Mass., has announced a new goggle lens which is claimed to have far greater impact resistance than any lens previously used in standard eye-protection equipment. This lens, known as the 6-curve Super Armorplate, is said to get its extra strength from its high curvature. The curvature of this lens, it also is stated, permits a closer fitting of the face without interfering with the eyelashes, tends to push fragments out and away from the eye in case of fracture, and deflects glancing blows more effectively.

◆ Electric or Gas-Electric Elevator Truck

The Elwell-Parker Electric Company, Cleveland, Ohio, has brought out a new design of industrial power lift truck. This truck, designated as Type ELN-6 elevator truck, has a capacity of 6,000



pounds, and may be operated either by electric or gas-electric power.

The truck itself is 41" wide and 128" long with a 27" x 54" platform. The height of the platform in low position is 11".

With telescoping uprights, the platform elevates 62½" before the inner uprights begin to rise. The actual height to which the platform may be raised depends upon the height of uprights, which in turn depend upon the weight of loads and other operating requirements for which the individual truck is designed.

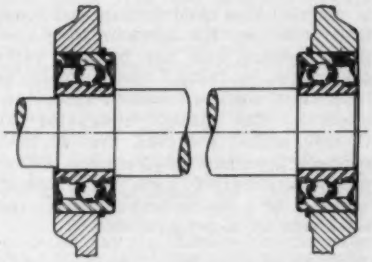
Two rugged chains are used for hoisting and lowering loads. Automatic cut-out switches are provided to stop platform at both upper and lower limits of travel. Travel of platform may be stopped manually at any height and held there by a spring actuated electro-mechanical brake.

The frame is built of extra large commercial shapes. Ball socket steering rods are located inside wheel base. Dynamic braking can be obtained for ramp operation, if desired. Truck steers on all four rubber tired wheels, and turns in 66" intersecting aisles.

◆ Enclosed Cartridge Type Ball Bearing

The Norma-Hoffmann Bearings Corporation, Stamford, Conn., has announced a completely enclosed cartridge type single-row ball bearing unit, designated as the "3000" Series, as an addition to its line of precision bearings. The inner and outer rings of the unit are of double row width. Metal seals held firmly in place by snap-rings on the outer race completely enclose and protect both sides of the bearing. These sealing plates are easily removable for inspection or for cleaning the bearing. The bearing is handled as a complete, self-protected cartridge unit at all times.

This bearing, made chiefly in the medium series starting at 25m/m bore, can be furnished with or without a



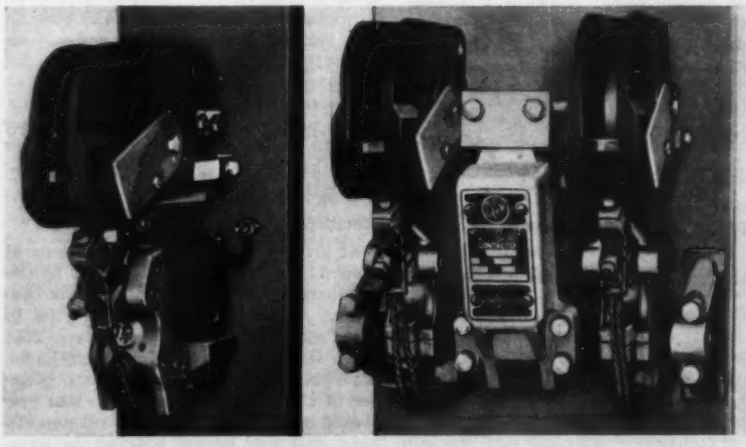
filling plug for renewal of grease. Where the filling plug is not employed, regreasing is effected by removing and replacing one seal. The bearing also can be furnished with or without the snap ring on the outer race.

◆ Industrial First Aid Kit

A new first-aid kit, designed to meet the specifications of leading industrial medical directors, has been developed by the Davis Emergency Equipment Company, 55 Van Dam Street, New York City.

The kit, known as the "Brac-Kit," consists of two baked enamel steel cases, an outer case which can be permanently attached to a wall by means of screws, and an inner case which is normally kept inside the outer, where it is held in place by a simple lock. When needed, the inner case can be unlocked by a twist of the handle and carried, with all necessary first-aid supplies, to scene of the accident.

The Brac-Kit contains ten D-carton

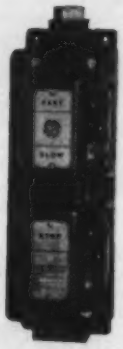


Magnetic contactor, d-c. (left) and a-c. (right)

first-aid units, each of which holds enough material to serve for several treatments. The exact assortment depends upon the industry in which the kit is to be used, but a widely accepted assortment is comprised of adhesive plaster, gauze compresses, individual swabs of Isodine (the new iodine antiseptic), individual cubes of Tannoid (tannic acid treatment for burns in a water-soluble jelly), ammonia inhalants (for fainting), eye dressings and a tourniquet.

◆ Push-Button Master Switches

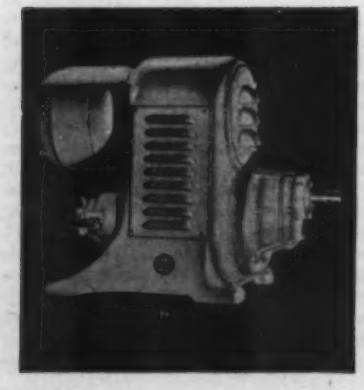
A new line of water-tight push-button master switches, mounted in molded phenolic-compound enclosures and intended for naval-type installations or equivalent industrial applications, has been announced by the General Electric Company, Schenectady, N. Y. Each unit



is operated by a molded-compound lever, thus protecting the operator from electrical contact with any metallic parts that might be "alive," and as many as four units may be mounted in one enclosure. The units, designated as CR2940 master switches, provide both normally open and closed circuits. Either momentary-contact units or a combination of momentary-contact and latched-in units are available.

◆ Upright Design of Variable Speed Drive

The U. S. Electrical Manufacturing Company, Los Angeles, California, has announced that its U. S. Varidrive, a variable speed drive of many applications, is now offered in an upright design as well as in the former horizontal design. The upright design saves lateral floor space and permits the take-off shaft to be at either the low or high position.



◆ "Gair Old Timers" Hold Annual Dinner

The "Gair Old Timers," an organization of present and former members of the Robert Gair Company, Inc., held their third annual dinner at the Hotel New Yorker recently. More than 160 men who are either present or past members of the Gair organization were brought together by the event, including some whose service with the company dates back as far as the 1870's. In addition to many who came from all sections of the East and middle-West, there were messages from those at more remote points who were unable to be present, among them E. Victor Donaldson, president of the Gair Company, who was unable to be present.

The "Gair Old Timers" annual dinner is a purely social function. This year the only address was an informal talk

Left to right—Top row: F. G. Wasgatt, 1891; George W. Gair, 1886; Harry D. Adriance, 1879. Lower row: Wm. W. Vorrall, 1882; Edw. W. Seaver, newly elected president of the "Old Timers," 1904; and John P. Markert, 1878.

by George W. Gair, son of the company's founder and Chairman of the Board of the Robert Gair Company, Inc., in which he reminisced amusingly on past events in the Gair Company's history. The only business transacted was the election of officers for the ensuing year. Those elected were: Edward E. Seaver of the Robert Gair Company, Inc., Philadelphia, Pa., president; P. L. Andrews of P. L. Andrews Corp, vice-president; Louis Barbieri, Sterling Engraving Company, secretary; Frank E. Marston, 1878, honorary president.

◆ E. W. Rice, Jr.

Edwin Wilbur Rice, Jr., 73, honorary chairman of the board of directors of the General Electric Company, passed away at his home in Schenectady, N. Y., November 25 after a long illness.

Mr. Rice was one of the pioneers of electrical development in the United States, and in association with the late Charles A. Coffin played a conspicuous part in the building of General Electric. He was largely instrumental in adding to the company's technical staff the late Charles P. Steinmetz; he encouraged the investigation by the company of the Curtis steam turbine and gave it a fair trial through a period of uncertainty until it became the foundation of a vast electric power system development; and he was chiefly responsible for the establishment of the famous General Electric research laboratory, having recommended that step to the directors in 1900.

◆ Annual Meeting of Paperboard Association

The annual meeting of the National Paperboard Association was held at the Waldorf-Astoria Hotel, New York City, Thursday, November 21. By a unanimous vote, the present officers of the association were re-elected for the ensuing year. The officers are: President, Sidney Frohman, Hinde & Dauch Paper Co., Sandusky, Ohio; vice president, W. J. Alford, Jr., Continental Paper Co., Ridgefield Park, N. J.; secretary-treasurer, H. S. Adler, Chicago; and executive manager, Frederick G. Becker, Chicago.

President Reports on Past Activities

President Sidney Frohman submitted a report on Association Activities of the Past Year, in which he covered in a concise manner the principal activities and accomplishments. Of particular interest were his concluding remarks on the program for the future. He said: "During the past year the demand for our product has shown a fair increase, and most companies have realized profit on their investments. We have made mistakes, and in every case the mistake of an individual has affected not only our industry, but also those to whom we sell our product. Let us remember that our customers are just as much interested in stabilization in their industry as we are in ours. If I were asked to give my individual suggestion as to a program for the future, it would be that we continue uninterruptedly the constructive activities under way in our Eastern and Western Groups; hold frequent meetings of members of our industry; bring into these meetings the few members of the industry not now participating; bring to each member the realization that he is in charge of an operation and that he is a success only when he conducts an enterprise which pays fair wages to its employees; which provides a return to the Government in the form of taxes on profit, and which pays a reasonable return to the stockholder. Anything less than this, in my opinion, fails to come under the definition of "Success."

Members of Code Authority Honored

At the afternoon session of the general assembly, recognition was given to the members of the Paperboard Code Authority, by the presentation of gifts to each member. These gifts were gold strap watches, engraved with the member's name, title and date. Each member of the Code Authority also was presented with an engrossed scroll done in black and gold letters, bearing the member's name, title, etc. The following

members constituted The Paperboard Code Authority: Sidney Frohman, chairman; W. J. Alford, Jr., vice chairman; E. Victor Donaldson; E. T. Gardner; Alan G. Goldsmith; Matthew J. Gray; J. W. Kieckhefer; Foreman M. Lebold; G. G. Otto; Walter P. Paepcke; D. H. Patterson, Jr.; H. L. Rauch; H. D. Schmid; and W. B. Turner, as members. Also Frederick G. Becker, executive manager, National Paperboard Ass'n; M. K. Whyte, counsel, and H. S. Adler, secretary of The Paperboard Code Authority.

The various groups held their respective sessions at which reports and matters of importance were brought up for discussion.

◆ Crane Appoints New Advertising Manager

Crane Co., Chicago, announces the recent appointment of H. H. Simmons as advertising manager. In co-operation with other aids to selling, such as exhibits, dealer service, special campaigns, and sales training, he will develop the advertising service so that it can be fitted into the general sales promotional program. In taking up his new responsibility, Mr. Simmons terminates a nine year association with Russell T. Gray, Inc., Chicago advertising agency, of which he has been vice-president and account executive.

Mr. Simmons goes to his new position with a broad training in advertising—particularly in the industrial field. After graduating from the University of Illinois in civil engineering, he spent the first years of his business life in the trade publication field, serving successively as associate editor, advertising representative and business manager. His more recent activity has been in the advertising agency field, both on general accounts and in specialized service to industrial advertisers. Among the markets which he has had opportunity to study intensively are power plant, oil and gas, railroad, chemical, food, municipal and construction. This experience fits him admirably for his new duties.

◆ Foxboro Company Expands

The Foxboro Company, Foxboro, Mass., has acquired an interest in the Atlantic Precision Instrument Company of Malden, Mass., which manufactures the Verigraph. This is an electrical device which determines and controls the moisture content of paper—also the thickness of dielectric material, such as rubber—and which has already proved its great value in the production of paper and rubber goods.

Albert Allen and Wilfred H. Howe, who have been connected with the Atlantic Precision Instrument Company for several years and have intimately carried on the work of this development, are now in the employ of The Foxboro Company. Mr. Allen's activities will be primarily in the sale of this equipment and Mr. Howe will join the Research Department.

◆ New Catalogues and Publications

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—"Aero-Vibe Screens in Paper Pulp Production" is the title of a new leaflet, No. 2211. A large illustration shows the screen in operation.

Allen-Sherman-Hoff Company, Philadelphia, Pa.—A catalogue, No. 735-H, recently issued, describes this company's Hydroseal Sand Pump and Maximix acid resisting pump. The advantages and characteristics of the Hydroseal principle and of the Maximix soft rubber parts are explained. The catalogue is well printed on heavy coated paper and is profusely illustrated with fine halftones in colors. There are also reproductions of blueprint drawings and tables of data.

Electric Air Heater Co. Div., Mishawaka, Ind.—A 24-page, comprehensive Data Book, No. 236, illustrates and describes space heating by Electromode forced heat, gives cost comparisons with other methods of heating, illustrates applications of the Electromode Industrial Portable and "Bilt-in Wall" all-electric fan type unit heaters. There is detailed information on heating costs, with all types of heating methods compared. Ease in installation, immediate availability of heat, sizes and styles to suit every application, and other factors of interest are included in the discussions. Copies upon request.

Ingersoll-Rand Co., Phillipsburg, N. J.—The Ingersoll-Rand method of air lift pumping of water, oil or other fluids is described in a recently issued bulletin, No. 9042. The advantages of air lift pumping over other methods for certain field conditions are brought out, several applications are illustrated and described, the theory of air lift pumping is set forth in detail, and a number of different compressors for supplying the air are shown. Copies on request.

Johns-Manville, New York City—"Fire Tamers" is the subject of a booklet that tells the story of research in the Johns-Manville Refractory Laboratory to check the ravages of flame on furnace walls, in the development of refractory cement. Each phase of the story is supplemented by actual photographs of the materials in use and of laboratory scenes. In addition, a brief description of the various everyday uses of the several kinds of refractories is presented. Copies on request.

Manhattan Rubber Mfg. Div., Passaic, N. J.—As the first edition of this company's new general catalogue published earlier in the year has been exhausted, a second edition has just been printed. This edition is very complete and will be sent on request to those who have not received a copy of the general catalogue.

Morris Machine Works, Baldwinsville, N. Y.—Bulletin No. 157 illustrates and lists the various designs of Morris pumps, hydraulic dredges and steam engines. In addition, the bulletin also includes considerable information and data of value to centrifugal pump users. Copies on request.

Reliance Elec. & Engr. Co., Cleveland, O.—New literature recently released by this company includes: Bulletins Nos. 118 and 119 on Type AA Reliance induction motors, squirrel-cage frames; and Bulletins Nos. 120 and 121 descriptive of Fully-Enclosed fan-cooled, Reliance Induction Motors. The information in these bulletins is graphically presented and they are punched for binding in regular binder.

SKF Industries, Inc., Philadelphia, Pa.—Two new booklets have just been received. One introduces the SA Type Pillow Block, a new addition to the SKF line of transmission appliances. The information concerning this new Pillow Block is presented in a very interesting manner and with considerable accompanying data. Another bulletin, entitled "SKF Bearings and Housings for Fans and Blowers," tells how SKF Bearings can be used to replace plain bearings on fans and blowers. Types of fans, shaft diameters and other designations for 86 actual changeover jobs are given.

Sullivan Machinery Co., Chicago—Sullivan utility hoists are featured in a new 2-color booklet just issued. Money saving applications of the company's equipment are suggested. Ask for bulletin 76-X.

BOOKS

A Guide to Applicants for Direct Loans—The Committee on Direct Loans of the National Conference of Business Paper Editors and The Associated Business Papers, Inc., has just completed a second study on direct loans which has been published in booklet form. In this publication there is a brief, concise differentiation between the three sources of governmental aid; Reconstruction Finance Corporation, Federal Reserve Banks and Federal Housing Administration. There is an outline of the legal requirements to be met in securing such aid—the study indicates what uses borrowed funds may be put to, what costs as to interest rates borrowers must pay, how to route applications to secure the speediest action, what equipment purchases are eligible for loans, and many other questions of vital interest to prospective borrowers are answered. In addition, the guide includes case studies of applications which were rejected by Federal Reserve Banks, pointing out weak spots in financial and managerial set-ups. Copies may be obtained from the A. B. P. headquarters, 330 West 42nd Street, New York City. The price is twenty-five cents per copy.

Lockwood's Directory of the Paper and Allied Trades—The Lockwood Trade Journal Company, 15 East 47th Street, New York City, has just released the 61st edition of this annual publication. The Mill Section, in which many changes have occurred, has been brought up-to-date. The listings in the equipment and supplies index have been carefully checked and corrected; in fact, every section in the book has been checked for changes and corrections. Users will find that the directory is adequately indexed for ready reference. This year's edition contains 1156 pages. Copies may be ordered direct from the Lockwood company for $7.50 per copy, or $7.00 cash with order.

The Metal Cleaning Handbook—This book, written by Robert W. Mitchell, Ph.D., and published by the Magnus Chemical Co., Inc., Garwood, N. J., is intended to provide a ready reference and guide for the use of those directly interested in, or concerned with, metal cleaning. It covers the various equipment, methods and materials and practical suggestions for their use. The book contains 216 pages, is printed on high grade enamel stock and is bound in stiff board covers on which are illustrated actual scenes in metal cleaning operations. Requests on business letterhead, giving official title or position, will bring a copy. To all others the book is priced at $1.00 per copy.

Publications on Paper and Paper Research—This publication on paper research consists of studies made by the National Bureau of Standards, Department of Commerce related to the standardization of paper and the materials and processes used in its manufacture. The list includes not only research reports of the paper section dealing principally with paper, but also reports from other sections of work relating to paper. Publications not listed are those which have become more or less obsolete through being superseded by later publications or because they contained information of temporary value only. The publications are listed in chronological order and are arranged in groups dealing with the same general subject. The material is indexed by authors as well as by subjects. The Bureau publications listed are available from the Superintendent of Documents. Other publications may be consulted in many of the larger libraries.

DRY PAPER EVENLY

STICKLE AUTOMATIC STEAM CONTROLS
DRAINAGE SYSTEMS FOR DRYERS AND HEATING SYSTEMS
CONDENSATION ECONOMIZERS FOR HEATING AIR
DEAERATING FEED WATER HEATERS, REDUCING VALVES
STEAM TRAPS, OIL AND STEAM SEPARATORS

STICKLE STEAM SPECIALTIES COMPANY, 2217 VALLEY AVENUE, INDIANAPOLIS, IND.

STANDARD LABORATORY SLOWNESS TESTER

AMERICA'S FIRST—AND PREDOMINANT—Slowness (Freeness) to laboratory precision with speed. Portable. Canadian Standard.

AUTOMATIC SLOWNESS TESTER

THE MILL MAN'S ONLY—Handy, practical, self-registering, popular with practical papermakers. No sampling.

STANDARD SHEET MOULD

Makes dependable sheets all alike under technically standardized conditions. Simple. Fast.

Clip this ad or write for particulars.

ARTHUR B. GREEN
249 HARRIS AVENUE - - NEEDHAM, MASSACHUSETTS

It Pays to Read the Advertising in

THE PAPER INDUSTRY

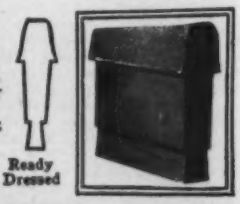
CORROSION RESISTING LININGS
STEBBINS
ENGINEERING & MANUFACTURING CO.
SEATTLE WATERTOWN, N.Y. MONTREAL

MISCO "C"
THE CORROSION RESISTANT ALLOY
CAST • ROLLED • FABRICATED
for all equipment exposed to corrosion by sulphite acids
MICHIGAN STEEL CASTING CO., DETROIT, MICH.

PULP MILL MACH'Y ◆ FINISHING ROOM MACH'Y
◆ FRICTION CLUTCHES ◆
THE MOORE & WHITE CO.
PHILADELPHIA, PA.
N. PHILA. STA. PENNA. R.R.
PAPER MILL MACHINERY

"READY DRESSED" MILL COGS
LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLINGTHAT CAN BE PUT IN A MORTISE WHEEL



WE MAKE ANY STYLE OR SIZE WANTED
WRITE FOR INSTRUCTION SHEET "O" WHICH IS FREE

QUICK SERVICE ON ALL SIZES
THE N. P. BOWSHER CO., So. Bend, Ind.

For The Papermaker's Library

Papermaking Research Around the World, by Dr. Louis E. Wise.

Identification and Microscopy of Woods and Wood Fibers Used in the Manufacture of Pulp, by Ellwood S. Harrar and J. Elton Lodewick.

Lessons in Paper Making, Part 1, by Harry Williamson.

Lessons in Paper Making, Part 2, by Harry Williamson.

Practical Helps for the Mill Man.

Each one of these publications contains a wealth of information, and they are priced at only fifty cents per copy prepaid.

THE PAPER INDUSTRY
333 North Michigan Avenue
CHICAGO ILLINOIS

◆ Facts and Figures Relating to Paper Manufacture in Sweden

The first paper mills, or rag mills, in Sweden were erected about 1520. (One of Sweden's leading paper mills of the present day in the fine-paper line—the Klippan—was established in 1573.) These early mills were hard pressed to furnish the paper required for official institutions, the universities and ecclesiastical authorities, etc. It was difficult to collect the rags needed for the paper making on even such a modest scale, and the mills were compelled to shut down for long periods owing to the scarcity of raw material.

Drastic regulations were issued enjoining householders to save the rags and deliver them up to the authorities, and mill owners were threatened with the loss of their charters if they did not keep their mills going to the utmost of their ability and the product up to standard. This was not easy to comply with, seeing that only white and uncolored rags could be used until the end of the eighteenth century, when a method for bleaching the rags was invented.

Owing to the difficulty of procuring raw material, the invention of the paper-making machine did not usher in a new era in the industry, but rather accentuated the lack of raw material. The first paper-making machine in Sweden was installed at the Klippan Paper Mill in 1832. The output certainly increased, but hand paper mills still survived, and there could be no question of turning out paper by the mile or reel. Only the success which finally attended the efforts of making paper from wood fibres made this possible.

During the decade 1850—1860 newsprint was made on a considerable scale from mechanical pulp, and with the invention of the chemical processes, the modern paper industry came into existence. *(Courtesy of American-Swedish News Exchange.)*

◆ Petitions for Tariff Reduction More Numerous

Since the disclosure by the Import Committee of the American Paper Industry of the attempt of importers to cause a flat reduction of 20 per cent in existing tariff rates by claiming for the products of other nations the preferential treatment given Cuban products, the number of individual cases involving this claim has risen to over 2,200. When the first announcement was made of this situation there had been less than 900 cases initiated.

Among the cases involving paper are the following new protests, all claiming a 20 per cent reduction from the normal rate:

Drawing paper from Germany.
Greaseproof paper from Germany.
Marbleized paper from Germany.
Metal decorated paper from Germany (two shipments).
Pulp board from Sweden.
"Paper" not further described from Germany (two shipments).
Carbonizing tissue from Italy.
Tea wrappers from China.
Photographic tissue (rotogravure) from England.
Baryta coated paper from Germany.
Baryta board from Germany.
Pulp board from Finland.

The Import Committee, by reason of its intensive study of foreign trade, was the first to call attention to this peril. All American industry is now aroused and these cases are causing the greatest furor in the history of the United States Customs Courts.

◆ HEATING, VENTILATING AND AIR CONDITIONING properly coordinated in a year 'round sense will be reflected in the equipment and processes to be demonstrated at the Fourth International Heating & Ventilating Exposition, to be held in Chicago in January 27-31, 1936. The proper conditioning of air in homes, offices and factories is now resulting in greatly improved efficiency and economy as the Exposition will demonstrate. One interesting tendency is the present policy of many manufacturers hitherto engaged in making only seasonal specialties to manufacture complete units for heating and conditioning the air at the same time, providing for its refrigeration and dehumidification.

A Quick • Easy and Safe Way To Buy Pipe

YOU can relieve your mind of pipe-ordering worry this short, simple, *safe* way . . . Just mail or wire your specifications for Armco Spiral Welded Pipe, and this strong, easy-handling, money-saving pipe will be delivered when you need it—"tailor-made" for the job. You'll find Armco "Spiral Welded" the fastest-installing pipe you've ever used, fit for practically every paper-mill requirement, with the right diameter, wall-thickness and lengths for your individual purpose. You have your choice of pipe galvanized after fabrication or mill-coated black pipe. Do what 97 other paper mills are doing—end pipe worry both in ordering and installation with Armco Spiral Welded Pipe. Just turn over your specifications to us at the address below.

ARMCO

THE AMERICAN ROLLING MILL COMPANY
PIPE SALES DIVISION
Middletown, Ohio

GEORGE F. HARDY

Consulting Engineer

305-309 Broadway, New York City, N. Y.

Member—Am. Soc. C. E.—Am. Soc. M. E.—Eng. Inst. Can.

Consultation	Paper and Pulp Mills
Reports	Hydro-Electric and
Valuations	Steam Power Plants
Estimates	Plans and Specifications

HARDY S. FERGUSON & COMPANY

CONSULTING ENGINEERS

200 FIFTH AVENUE NEW YORK CITY

Hardy S. Ferguson—*Member A.S.C.E. A.S.M.E. E.I.C.*
Moses H. Teaze—*Member A.S.C.E. A.S.M.E. E.I.C.*
J. Wallace Tower—*Member A.S.C.E. A.S.M.E.*

Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of { PULP AND PAPER MILLS AND OTHER INDUSTRIAL PLANTS / STEAM AND HYDRO-ELECTRIC POWER PLANTS / DAMS AND OTHER HYDRAULIC STRUCTURES

FITCHBURG DUCK MILLS

ESTABLISHED 1844.

FITCHBURG, MASS.

CANVAS DRYER FELTS

Fine Faced "English Woven" Felts for Fine Papers, 60 Inches to 288 Inches in Width.

CHEMIPULP PROCESS, INC.

CHEMICAL PULP MILL ENGINEERS

CHEMICAL PULPING PROCESSES, OPERATING SURVEYS
APPRAISALS ESTIMATES

WOOLWORTH BUILDING
WATERTOWN, N. Y.

CANADIAN AGENCY: 319 CASTLE BUILDING, MONTREAL, P. Q.
PACIFIC COAST OFFICE: 3511 FIRST AVE., SOUTH, SEATTLE, WASH.

VEST POCKET POWER PLANTS

Small space occupied, any capacity, low over-all operating costs, high and extreme efficiencies, reliability, low initial investment.
Complete power plants to meet any operating conditions of Pulp and Paper mills or other industrial service. Engineering and Construction.
Satisfactory Services Always Guaranteed.

FERGUSON ENGINEERS

Power Specialists
Monadnock Bldg., Chicago

LAMOTTE SERVICE

pH Control—Boiler Feedwater Control—
Chlorine Control

Standard Routine Tests Developed by LaMotte Research Department Promote Better Control of Processes

pH CONTROL
- in the Beaters
- in the Sizing
- in Filling, Coating, and Coloring
- in Eliminating Deposition of Pitch on Wires, Rolls and Felts
- in White Water Recovery
- in Quality of Mill Water Supply
- in Finished Paper

CHLORINE CONTROL
- in Treating Mill Water Supply, etc.

BOILER FEED WATER CONTROL
- Simplified Outfits for Controlling Treated Water or in Analyzing Untreated Water for: Alkalinity . . . Chlorides . . . Dissolved Oxygen . . . Hardness . . . Phosphates . . . pH . . . Sulphates

La Motte Outfits are accurate, they are inexpensive, and they are easy to operate. Send for further information.

LaMOTTE CHEMICAL PRODUCTS CO.
436 LIGHT STREET BALTIMORE, MD.

Pulp and Paper Mill Screens

of STAINLESS STEEL—COPPER—BRONZE—
MONEL—CHEMICAL RESISTING ALLOYS

Perforations that are accurate in size and alignment
ANY METAL •• ANY PERFORATION

The Harrington & King PERFORATING Co.

5654 Fillmore St., Chicago, Ill. • 114 Liberty St., New York, N.Y.

The best test of the value of a Fourdrinier wire is on a paper machine. There can be no substitute for that experience.

Lindsay Fourdrinier Wires

successfully meet that test. We furnish them in *Longcrimp* and *Modified Longcrimp, Duo-Wear* and *Regular Weave.*

The Lindsay Wire Weaving Co.
14025 Aspinwall Avenue Cleveland, Ohio

THE NEW FULTON SYSTEM

FOR

BOARD • KRAFT • STRAW

MACHINES

1. Increases Production from 10% to 30%.
2. Saves up to 50% in Steam Consumption.

Write for Bulletin No. 40.

Midwest-Fulton Machine Company
DAYTON, OHIO

The Paper Industry Safety Contest

July 1, 1935 to June 30, 1936

Cumulative Scores as of October 31

37 Perfect Scores

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A	Hollingsworth & Whitney Co.	Algonquin & Taconnet	Waterville, Me.
	Bryant Paper Co.	Kalamazoo	Michigan
GROUP B	Kimberly-Clark Corp.	Badger-Globe	Neenah, Wis.
	St. Croix Paper Co.	Woodland	Maine
	Container Corp. of America	Cincinnati	Ohio
	Fibreboard Products, Inc.	Vernon	California
GROUP C	Continental Paper & Bag Corp.	York Haven	Pennsylvania
	International Paper Co.	Little Island	No. Tonawanda, N. Y.
	Finch Pruyn & Co., Inc.	Glens Falls	New York
	Crystal Tissue Co.	Middletown	Ohio
	Hoberg Paper & Fibre Co.	Fibre Div.	Green Bay, Wis.
	Consolidated Water Power & Paper Co.	Appleton	Wisconsin Rapids, Wis.
	Ontonagon Fibre Corp.	Ontonagon	Michigan
GROUP D	Harriman Co.	Harriman	Tennessee
	Port Huron Sulphite & Paper Co.	Paper Mill	Port Huron, Mich.
	International Paper Co.	Webster Mill	Orono, Maine
	Hollingsworth & Whitney Co.	Cobbossee & Aroostook	Gardiner, Maine
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	U. S. Gypsum Co.	No. Kansas City	Missouri
	Central Fibre Products Co.	Vincennes	Indiana
	Spaulding Fibre Co., Inc.	Milton	Milton, N. H.
	International Paper Co.	Livermore Mill	Chisholm, Maine
	U. S. Gypsum Co.	Gypsum	Ohio
	Central Fibre Products Co.	Mt. Carmel	Illinois
	Hollingsworth & Whitney Co.	Abenaquis	Madison, Maine
	International Paper Co.	Riley	Maine
	Spaulding Fibre Co.	Hayes	No. Rochester, N. H.
	Mead Paperboard Co.	Rockport	Indiana

Division II—Remanufacturing

	Union Bag & Paper Corp.	Specialty	Hudson Falls, N. Y.
	Union Bag & Paper Corp.	Grocers	Hudson Falls, N. Y.
	Continental Paper & Bag Corp.	Elisabeth	New Jersey
	Kimberly-Clark Corp.	Atlas	Appleton, Wis.
	Container Corp. of America	Anderson	Indiana
	Container Corp. of America	Natick	Massachusetts
	Texas Corrugated Box Co.	Dallas	Texas
	U. S. Gypsum Co.	Genoa	Ohio
	Bemis Bro. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P- 78	3	1	1.732
	P-101	4	2	3.966
	P- 44	5	3	5.602
	P- 31	6	3	7.244
	P- 19	7	4	7.526
	P- 67	8	6	7.771
	P- 12	9	4	8.330
	P- 27	10	10	8.405
	P- 1	11	7	8.629
	P- 64	12	4	9.107
	P- 10	13	5	9.539
	P- 2	14	5	10.214
	P- 62	15	7	10.523
	P- 13	16	7	11.704
	P- 18	17	8	11.798
	P- 69	18	7	12.587
	P- 23	19	6	13.903
	P-102	20	11	18.485
	P- 95	21	11	23.070
	P-114	22	14	34.464
	P- 87	23	14	26.863
	P- 73	24	22	34.072
	P- 74	25	26	41.492
	P- 71	26	25	53.784
GROUP B	P- 26	5	1	2.811
	P- 22	6	1	3.008
	P- 11	7	1	3.259
	P- 68	8	2	6.148
	P- 21	9	3	7.910
	P- 51	10	3	10.972
	P- 60	11	4	13.291
	P- 3	12	4	13.787
	P- 82	13	5	13.937
	P-112	14	5	17.625
	P- 25	15	8	20.279
	P- 16	16	7	23.215
	P- 40	17	10	25.648
	P- 76	18	11	37.642
	P- 32	19	15	39.801
	P- 45	20	13	42.085
	P- 77	21	14	51.920
GROUP C	P- 59	8	1	4.551
	P- 55	9	1	7.447
	P-103	10	1	7.887
	P- 97	11	1	8.060
	P- 72	12	3	12.911
	P- 37	13	3	14.957
	P- 6	14	2	15.064
	P- 47	15	3	19.482
	P- 41	16	3	20.508
	P- 29	17	4	21.031
	P- 4	18	5	21.616
	P-104	19	5	21.627
	P- 88	20	5	24.751
	P- 48	21	5	27.814
	P- 75	22	6	32.994
	P- 34	23	5	35.128
	P- 49	24	5	35.856
	P-111	25	6	35.871
	P- 14	26	6	43.095
	P- 89	27	8	49.235
	P-107	28	7	52.411
	P- 33	29	10	56.254
	P-113	30	15	76.293
	P- 50	31	15	114.044
GROUP D	P- 7	16	1	9.078
	P- 90	17	1	16.558
	P-116	18	2	18.932
	P- 94	19	2	22.978
	P-118	20	2	24.882
	P- 80	21	3	25.601
	P- 36	22	2	30.570
	P- 53	23	2	30.926
	P-117	24	3	33.397
	P- 8	25	2	36.079
	P- 42	26	3	47.299
	P- 98	27	5	47.713
	P- 24	28	5	64.218
	P- 99	29	4	69.744
	P-106	30	7	69.883
Division II	R- 1	10	1	7.330
	R-18	11	1	7.599
	R- 5	12	3	8.062
	R- 3	13	1	10.913
	R- 6	14	5	11.707
	R-21	15	4	12.405
	R- 2	16	4	13.098
	R-14	17	1	20.326
	R-10	18	9	43.137

No October report: Fibreboard Prods. Co., Vernon, Calif.; Cont. Paper & Bag Corp., Elisabeth, N. J.; P-55.

Withdrawn: P-79, P-83, R-17.

The New DeZurik "BEATER TYPE" Stock Consistency and Weight Regulator

EXCLUSIVE ADVANTAGES

Agitator recirculates and mixes regulated stock with raw stock for most accurate regulation.

Constant head water tank insures uniform dilution water pressure.

Does not dilute stock in storage chest.

Consistency feeler is directly connected to dilution water valve for instantaneous operation.

Compact stuff gate unit built into machine.

Let this regulator prove itself by a trial installation in your own mill.

Write for Details

DEZURIK SHOWER CO.

SARTELL MINNESOTA

OLD at 40?

On the contrary we are an enthusiastic, progressive organization constantly originating and perfecting new ideas for the production of Fourdrinier wires.

The development of new processes, the designing and building of new machinery and equipment to meet the demands of progress in modern paper making is just as much a part of our business as the preparation of raw material and the weaving of the wire fabric.

Our age only proves our dependability.

Appleton Wires Are Good Wires

APP-WELD PATENTED SEAMLESS JOINT

PHOSALOY WIRES

Appleton Wire Works, Inc.

Appleton, Wisconsin

WEB TENSION DEVICE SYNCHRONIZES WINDER WITH CALENDER STACK

New Camachine 46-9 assures firm uniformly wound rolls

Send for descriptive literature

CAMERON MACHINE COMPANY
61 Poplar Street,
Brooklyn, N. Y.

POWER

GENERATION + UTILIZATION + MAINTENANCE

By W. S. JOULE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

◆ Belts and Belt Dressing

Where leather belts are in a dry, warm place they require some oily dressing to keep them pliable and to make them grip. A belt allowed to become dry will become weak and will wear out far sooner than it ought. Putting dry powdered resin on a belt in this condition to make it pull is a bad thing for the belt, as it dries it out still more.

Some animal oil, "neat's-foot," for instance, is probably best, though castor oil has many friends. Do not use too much. Where a belt is soaked with oil it gives trouble by slipping and running off. Such a belt may not transmit half the power it should. Something to absorb the oil from the belt is wanted. Powdered chalk will probably make the belt pull its load again. Keep the lumps scraped off.

A good liquid dressing that will keep the belts pliable and in good condition for work is: Beeswax 4 lb., pitch 5 lb., resin 3 lbs., neat's-foot oil 13 lb.

Melt the beeswax first and add the other ingredients in the order named. For winter use 15 lb. neat's-foot oil instead of 13. Dress the belt both inside and outside. Be careful not to use too much dressing.

◆ Boiler Overhauling and Laying Up

Once a year, at least, every steam boiler should be given a complete overhauling. Usually the annual official inspection is made at this time and much of the work forming part of the general overhauling conforms to the suggestions and in some instances the explicit orders of the inspector. All recommendations made by the inspector should be noted carefully and they should be carried out faithfully, whether they relate to the boiler or to accessory apparatus of any kind.

Repairs should be carefully executed and makeshift methods should never be tolerated. Repairs, whether trivial or serious, should never be made upon a boiler, pipe or other vessel while it is under pressure.

When a boiler is to be put out of service for a considerable period of time, it should be emptied and every accessible part, both inside and outside, should be thoroughly cleaned. All soot should be scrupulously cleaned from the external surfaces because after a time the soot is likely to become damp due to moisture from the air, and corrosion is almost sure to follow. The tubes should be carefully cleaned and all deposits of dust and ashes removed from the furnace, combustion chamber, and setting, both inside and outside. Scale and other deposits should be removed as completely as possible, and the boiler should be thoroughly washed out. Any water that remains can be removed by mopping or, as some engineers advocate, by a light fire in the furnace of paper or other loose material. This is not advised since there is danger that the attendant may build too brisk a fire and damage the boiler. The manhole and handhole plates should be left off to allow air to circulate freely through all parts of the boiler. If this is done the interior will dry out without special heat, and if the boiler is in a battery in operation it will dry rapidly.

The steam and water connections to the boiler must be closed perfectly tight to keep moisture from leaking into the boiler while it is laid up. As a precaution against corrosion it is a good plan to place a small quantity of unslaked lime inside the boiler. Boilers which lie idle during certain parts of the year should be cleaned and dried with special care each time they are put out of service.

After being laid up the boiler should be carefully examined to see if it needs repairs. Any repairs found necessary should be made immediately, so that in case of emergency the boiler can be restored to service without delay.

◆ Recipe for Stack Paint

Following is a recipe for an excellent paint for iron stacks: 50 lb. finely powdered foundry graphite, 16 lb. white lead, 10 gal. boiled linseed oil, 1 lb. lampblack, 1 gal. japan.

This makes about 14 gal. and covers 2,900 square feet of surface one coat, which is equivalent to 205 or 210 square feet per gal. The amount given in the recipe is the quantity required for two 50 in. by 80 ft. and one 42 in. by 70 ft. stacks.

◆ Valves Should Be Repaired

From a reliable source comes the statement "a ½-in. diameter valve stem leaking all around the stuffing box will blow about 40 lb. of steam per hour, with 100 lb. pressure in the valve." It is easy to estimate what this sort of thing does to the coal pile in a month or a year.

Leaky valves should be repaired as soon as possible after the leak is discovered. Leaks in valves sometimes may be due to the distortion of the valve seat caused by the weight of piping carried by the valve. There should be supports near all valves. Sometimes valves are seriously strained when being assembled into the piping by carrying the twist through the body of the valve. The wrench always should be applied to the end at which the threaded connection is being made.

When lead or similar substance is used in making up joints, it always should be put upon the entering part. The excess is then forced back upon the outside and can be wiped off instead of being pushed inside where it may cause trouble on valve seats or at other points.

If the threads on pipe are run back too far, trouble may result, especially in the case of lightweight valves, due to the pressing of the pipe against some part of the valve in such a way as to cause distortion of the seat. Valves on high pressure lines of 6 in. diameter and larger should be provided with a bypass. The bypass not only makes it possible to operate the valve more easily but reduces wear of the valve due to the fact that the main valve may be virtually balanced while being opened and closed.

All dirt and scale should be rapped and scraped from pipe, valves and fittings before erecting and all new work and repair work should be blown out, with live steam if possible, before being put into service.

◆ MANY TIMES control of combustion has been interfered with by the shifting of the damper plate on its shaft. To check the damper position, the use of a sensitive draft gauge is convenient. While the stack is in service the ends of the draft gauge are connected to the breeching on both sides of the damper. The position which shows the highest differential draft will be when the damper plate is across the breeching and the damper is closed. The lowest differential draft will be indicated when the damper is at right angles to its closed position or wide open.

◆ OIL FOR AIR-COMPRESSOR cylinders should have a flash-point of 550 to 600 deg. F., according to the air pressure and rapidity of compression; for steam cylinders, operated with superheated steam, upward of 600 deg., according to the amount of the superheat. Saturated steam will not disintegrate oil of 550-deg. flash-point. For internal-combustion engine cylinders, oil of as low flash-point as will do the work should be used (about 450 deg.), as the heavier oils are apt to leave a sooty residue.

Free Flowing

GRASSELLI

TRI-SODIUM PHOSPHATE

A mild alkaline salt for cleaning of felt and all general cleaning purposes. A trial will convince you of its merits.

Other Grasselli Chemicals for Paper Manufacturers

Acetate of Lead	C. P. Ammonium Hydroxide
Aluminum Sulphate, Commercial	C. P. Hydrochloric Acid
Aluminum Sulphate, Iron Free	C. P. Nitric Acid
Aqua Ammonia	C. P. Sulphuric Acid
Barium Carbonate	Muriatic Acid
Barium Chloride	Salt Cake
Barium Sulphate (Blanc Fixe)	Silicate of Soda
Bleach	Soda Ash
Caustic Soda	Sulphuric Acid

Our Research Department may be of help in solving some of your problems. This service is available to you. *Write, wire or phone our nearest branch below.*

THE GRASSELLI CHEMICAL COMPANY
Founded 1839 INCORPORATED **Cleveland, Ohio**

GRASSELLI

New York and Export Office: 350 Fifth Avenue

DUPONT

BRANCHES AND WAREHOUSES:

Albany, Birmingham, Boston, Charlotte, Chicago, Cincinnati, Detroit, Milwaukee, New Haven, New Orleans, Philadelphia, Pittsburgh, St. Louis, St. Paul

San Francisco, 584 Mission Street
Los Angeles, 2260 East 15th Street

Represented in Canada by CANADIAN INDUSTRIES, LTD.
Acids and General Chemicals Division—Montreal and Toronto

TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

IN THE PAPER INDUSTRY

◆ Ultraviolet Light in the Paper Industry

The importance of ultraviolet light to the papermaker has been pointed out in previous abstracts (Cf. THE PAPER INDUSTRY, May 1934, p. 53; January 1935, p. 715; April 1935, 129-131). The present abstract combines two recent articles, the one appearing in a German, the other in a British journal. The German author gives a brief review of the applications of luminescence analysis. Here

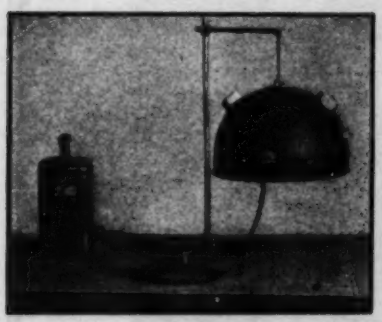


Figure 1

a new portable type of lamp shown in Figure 1 may be used. This is provided with a dark uviol glass tube, in place of the usual quartz tube. The semispherical metal cap which houses this tube is provided with two openings, through which observations may be made or photographs may be taken. Dark filters, formerly required to exclude the visible light, are no longer necessary and the lamp operates by a simple switch, like any ordinary incandescent lamp. Its light intensity, it is claimed, corresponds to that of the usual analyzing quartz mercury vapor lamp, and the wave length emitted by the new lamp, approximates 366 millimicrons (which according to the author is the optimum spectral region for studying fluorecence effects). The recent work in fluorescence analysis is then outlined. For example, the artifical tannins when added in small amounts to sulphite liquor show a fluorescence even in dilutions of 1 part in 100,000, while aqueous extracts of natural vegetable tannins are non-fluorescent. Cellon and Cellophane, when treated with extractives of spruce needles show marked differences. The former manifests a barely visible fluorescence, while the latter shows a marked violet fluorescence. The fluorescing differences between the various pulps are also stressed. In Figure 2, the results of W. R. Mansfield with paper samples are reproduced. (This same illustration appears in the British article). The upper row of paper test strips was photographed in ordinary light. The lower row was photographed in ultraviolet light. In this cut, Nos. 1 to 4 represent samples containing four different yellow dyes. In ordinary light they appear very similar, but sharp differences crop up under ultraviolet light as shown in the luminograms. (No. 1 appeared golden; 2, pale yellow; 3, deep brown; and 4, yellowish gray.) Nos. 5 and 6 are taken from the same sample as 4. However they represent exposure to sunlight for one week and to ultraviolet light for two hours, respectively. The photographs in the top row show no differences, but in the bottom row, while 4 and 6 are very similar, 5 shows the marked effect of protracted exposure to sunlight. Again by the use of ordinary photography, No. 7 which contains wax size, and No. 8, which contained no size, are practically identical. Under ultraviolet light, the particles of wax size become quite visible as white specks against the gray background in 7. The work cited here is that of other investigators and 13 references are given. The British article is much more comprehensive. The nature of ultraviolet rays, and their production are quite fully discussed. In the use of mercury vapor lamps, form which visible light must be filtered out, the author prefers the use of screens

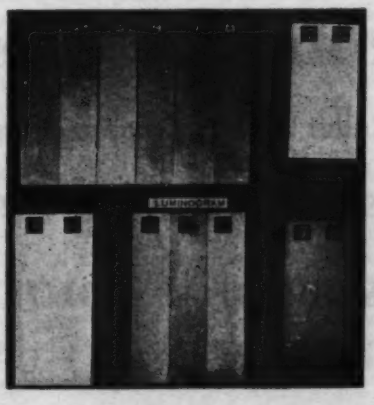


Figure 2

containing Wood's glass, in which nickel oxide is utilized. This type of screening is essential so that fluorescence may be observed (compare with the modifications in the new German partable lamp, outlined above). Without generalizing on the question of the technique for applying ultraviolet light, the author points out that containers for liquids must be non-fluorescent, and must be transparent to both visible and ultraviolet rays. In general, quartz is used. The state of fineness of division of a solid sample, or the degree of dilution of a solution are often important factors in observing fluorescence. For example, there may be an optimum dilution as well as an optimum pH value at which the strongest fluoresence obtains. Prolonged exposure to light also has a modifying influence, and observations should be made as soon as possible after starting the lamp. Some-

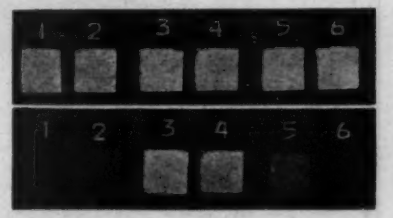
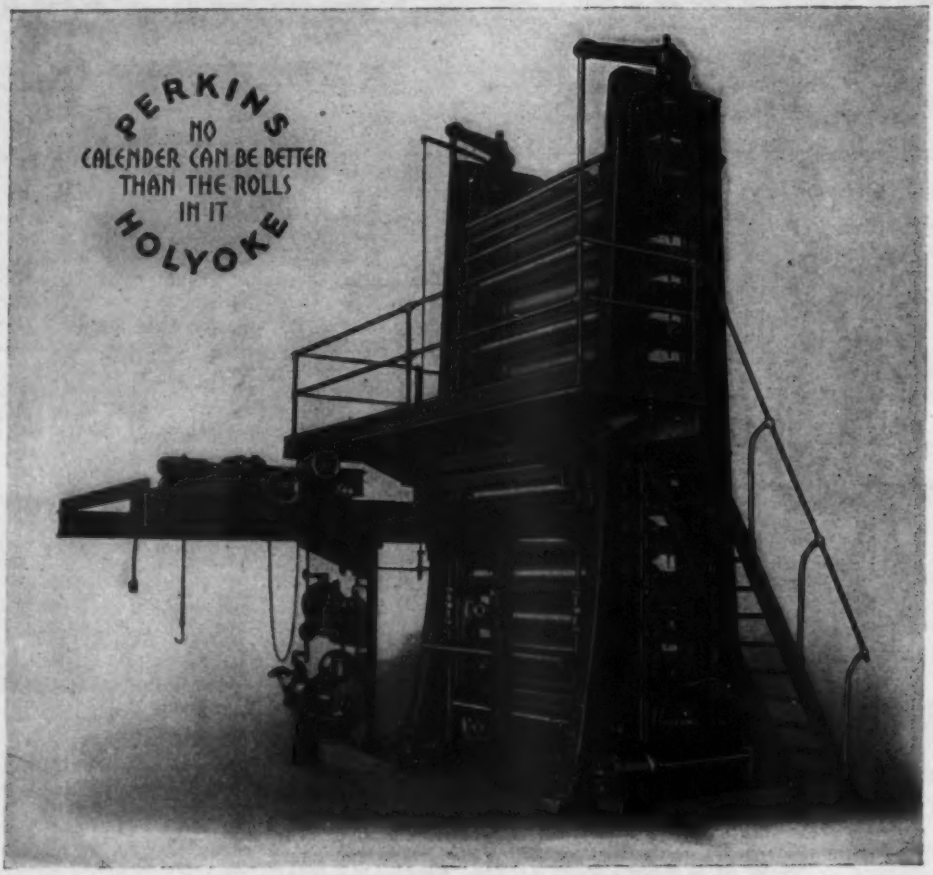


Figure 3

times a 15 minute exposure causes modifications. While various methods for recording the intensity and color of fluorescence have been proposed, photography (despite its limitations in showing subtle color variations) is generally recommended. A remarkable effect of the bleaching of sulphite pulp is the change of its bluish-white fluorscence to a dull yellow. By such fluorscence phenomena, pulp may be graded, and the method can serve as a rough control in checking the actual bleachability of a new pulp sample by comparing it with a known standard. Attempts are being made to correlate these fluorescence measurements with the chlorine number of a pulp. The difficulty in titrating dark-colored waste liquors has been overcome by using indicators which fluoresce, and which change in color or intensity at various pH values. For example the black liquor from soda (esparto) pulp may be titrated with sulphuric acid using quinine, which manifests a brilliant blue fluorescence as soon as the acid is present in slight excess. The pH of turbid liquids may also be sharply determined by using suitable fluorescent indicators. Differences in various loading materials are also brought out through ultraviolet light. This is well illustrated in Figure 3. The upper and lower rows again represent photographic effects under ordinary and in ultraviolet light respectively. While the upper row fails to show differences, the lower row gives differences which are sharp and even startling, since some of the photographs are practically blotted out. In this



Typical of Perkins Advanced Engineering is this Splendid

FOURTEEN-ROLL WEB SUPERCALENDER

Timken Roller Bearing Equipped Throughout

Extremely Rugged • Extra Heavy for High Speeds • Perfectly Balanced

B. F. PERKINS & SON, INC., HOLYOKE, MASS.

CALENDER ROLLS
Cotton • Interleaved (patented) • Paper

SUPERCALENDERS
Plain Papers • Glassine (patented) • Coated Papers

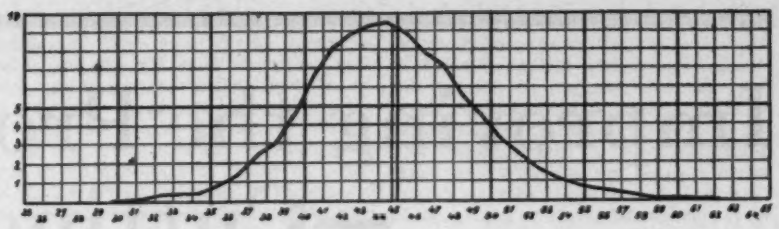
EMBOSSING ROLLS

GRANITE PRESS ROLLS

Bursting • **MULLEN PAPER TESTERS** • Tensile

RAG AND STOCK CUTTERS

figure, (1) is a commercial china clay; (2) an adulterated china clay; (3) and (4) are two grades of zinc oxide, and (5) and (6) are two grades of precipitated chalk. Coloring matters (as shown by the German author; Cf. Figure 2) may also be differentiated by fluorescence studies. Besides the wax spots alluded to above (in the case of sizing), the identification of spots and blemishes is greatly facilitated by fluorescence analysis. For example, oil spots fluoresce bright blue; resin spots, yellow; scum, brown; starch spots, blue; and shives from dark lines. In the measurement of water resistance, fluorescence also plays a role. Often by the ordinary methods it is difficult to ascertain just when penetration has actually taken place, and errors of 10 per cent are quite frequent. However certain dyestuffs (like Rhodamine 6G) fluoresce brilliantly at the instant that moisture strikes them, and thus the first signs of penetration may be gauged very sharply. Similarly, greaseproofness may be determined with a much higher degree of accuracy by making use of the fluorescent properties of the oil penetrating the paper. If a non-fluorescing vegetable oil is used in the penetration tests, this may hold in solution fluorscent dyes. The author also outlines the determination of fiber content through fluorescence microscopy, and the examination of paper cross sections in ultraviolet light. Ultravoilet methods as applied in fading tests are of extreme practical importance. In routine or in research work, it has been found convenient to expose a sample of paper to unfiltered ultraviolet light, and to record the minimum time required to produce the first change in fluorescence, in filtered ultraviolet light. This amounts to a greatly accelerated fading test. The correlation of such speeded tests with the usual form of folding test was shown to be roughly 70 per cent, over a period of two years of intensive work by the author. An even better relationship exists, when the paper is exposed to sunlight, and the minimum time required to produce a visible change in fluorescence in filtered ultraviolet light is recorded. This is a slower procedure, than the one recorded above, but of course is more rapid than the usual method of testing light-fastness of colors in paper. The drawbacks of the methods are also briefly mentioned. In rendering a decision as to whether or not the degradation of gelatine-sized paper has been affected by heat or by light. If a marked difference exists between the fluorescence on the two sides of the sheet, light was probably the agent responsible for the change. Besides the above applications, fluorescence plays a role in detecting ink eradications, falsifications, and the genuineness of watermarks. The author cites the example of two bank notes, which could not be differentiated by the usual microscopic tests although one was believed to be false. The colored designs on the two however appeared very different from each other under ultraviolet light. Differences in the true and false watermarks were also noted, since one note had a spurious watermark produced by stamping with oil, which gave rise to a marked fluorescence. Uses of fluorescence tests, in philatelic work and antiquarian research are thus suggested. A. Kufferath. Wochbl. Papierfabr. (T. S.) 163-5 (1935). Julius Grant. Paper-Maker and Brit. Paper Trade J. 90, No. 1 (T. S.) 110-2; No. 2 (T. S.) 120-5 (1935).



◆ Specific Gravity of Woods

This is probably one of the most comprehensive studies ever made on the specific gravities of various samples of spruce pulp wood grown in different parts of Germany and in other European countries. The investigation was carried out in collaboration with a group of pulp and paper mills. Discs of wood were dried at 100-105 deg. C., and the determinations were made by Niethammer's method [Cf. Papierfabr. 29, 559 (1931) and THE PAPER INDUSTRY, May, 1934, 133]. In the following list which summarizes all data, the figures given in parentheses record the number of samples studied, while the specific gravities are always the mean values:—woods from Central Germany (8983), 0.447; South German woods (2054), 0.452; woods taken from the Fichtelgebirge and the Bavarian Forest (1074), 0.459; East Prussian woods (93), 0.42; Austrian woods (554), 0.457; Czechoslovakian woods (3187), 0.445; Roumanian woods (3427), 0.447; Polish woods (586), 0.438; Baltic woods (430), 0.45; Finnish woods (368), 0.453; Swedish woods (450), 0.453. It is interesting to note that the mean value for all German spruce woods irrespective of locality is 0.448, while that for all other European countries, taken collectively, is 0.447. The mean values obtained for East Prussian woods is very low, and even lower and further removed from the general mean are the values for Roumanian woods, but this may be due in part to the relatively small number of samples used in either case. The article gives 19 relative frequency curves or graphs, in which the percentage of the total samples are given as ordinates and the specific gravities as abscissas. Only one of these graphs is reproduced herewith. This figure shows that the maximum point of the curve (i. e., the specific gravity most frequently met with is very close to the mean value of 0.448, in the case of the 21,299 samples studied. The author points out that the densities of spruce pulpwoods should not be confused with the mean densities of wood occurring in all parts of the spruce tree. The figures are for representative boles, such as would be used in the paper industry, and as the composite graph shows the minimum is about 0.30 and the maximum specific gravity about 0.62. There is a marked correlation between the density of the wood and the width of the annual rings as Trendelenburg (Tharandter Forstliches Jahrbuch 1934, 688) has shown. However, such general relationships must be closely scrutinized in individual cases, since the same width of ring may be coupled with very different densities, depending on the formation of the crown and the root system of an individual tree. Normally, when specific gravity is plotted against the width of the annual ring, however, smooth curves result; the density of the wood dropping as the ring width increases. The mean specific gravity in a study of 599 samples of Scots pine was 0.505; while 508 samples of aspen showed a mean specific gravity of 0.454. Rudolf Sieber. Papierfabr. 33 (T. S.), 305-8; 313-19 (1935). (The interested reader is also referred to a recent resumé by Trendelenburg, on the specfic gravity of spruce, fir, larch and pine, in Zellstoff-Faser 32, 129-31 (1935)).

◆ Mottled Papers

The following may be used as mottling fibers: (1) uncooked halfstuff, red, black, and blue cotton, and bast fibers retaining their original coloration; (2) sulphate pulp, brown and white groundwood, sulphite, and esparto; (3) a specially prepared, degreased wool, which probably gives the most satisfactory mottling effects. Unless the cleaned wool is already dyed at the spinning mill, it may be treated as follows: after soaking in hot water, it is placed in a convenient dye vat with a dye solution representing about 20-30 times the weight of the fiber. Acid dyes are used and the dyeing period is about ¾ to 1 hour, the dyeing being carried out in the presence of 2-3 per cent (66 deg. Bé) sulphuric acid based on the dry weight of fiber Dye solutions should be diluted very slowly by gradually pouring the dye solution into cold water. Screening of the dyebath is recommended before it is added to the wool fiber. Brief directions are given for the preparation of so-called bleeding or halo-forming wool mottled fibers, as well as for the preparation of mottled fiber stock from cotton, linen, jute and wood pulps. For example, the fibers from white groundwood are best dyed in the kollergang. The addition of mot-

Improving the Product —Cutting the Cost

In refining most of the different kinds of stock for making paper, a considerable expense is involved —in fact, it constitutes one of the major cost items of making paper.

By the use of the FRITZ REFINING AND HYDRATING MACHINE, the cost of stock preparation can be lessened. This machine will cut your refining cost by doing the following:

It will require less power.

It will lessen the "broke."

It will require much less floor space.

It will allow for speeding up the paper machine.

The result will be a stronger and better sheet of paper.

If you are interested in cutting production costs and making better paper, write us.

This machine is brushing and hydrating 60 tons of bleached sulphite pulp daily. Aside from this machine, there are only two 1500-lb. beaters and two small jordans in this mill making high grade bleached sulphite papers.

Love Bros., Inc.

Aurora, Ill.

tled fiber stock to the stuff should take place only after the latter has been completely beaten. This procedure results in a simple thorough mixture. Besides their use in envelopes, wrapping, printing, and writing papers, mottled fibers may be used to very good effect on imitation chromo board and duplex board, (although mottling is seldom encountered in these products). Erich Friedrich. Wochbl. Papier-Fabr. 66, No. 19, 361-2 (1935).

◆ Through-tear Paper Testing

Last year Drs. Brecht and Imset showed that there was an essential difference between the initial tearing of paper and the so-called through-tearing of the sheet, and they discussed the mechanics of the resistance to tear obtaining in the two operations (Cf. Zellstoff und Papier 14, 14-16, 1934). Subsequently they devised a new instrument in which a plunger operated by a lever serves to tear the sheet. This is an attempt to correct the faults of the Elmendorf tester, in which, when a number of sheets are tested together, the initial cut (owing to the design of the knife) is far from identical in all of the sheets; in which splitting occurs in the outer sheets, and where the friction between the torn edges appears to give rise to an abnormal increase in tear resistance. (These factors are discussed at length in Papier-Fabr. 31, Fest und Auslandsheft, 46-60, 1933; and are also briefly but clearly outlined in Chem. Abstracts, 28, 1529-30 1934.) The new instrument, which is termed the Brecht-Imset through-tearing tester, has now been applied by other investigators in mill practice. Various types of paper were tested, and the data indicate that the apparatus is entirely practical in evaluating paper strength. Variations in the degree of beating and in stock mixtures affect the test. The new instrument is also recommended because of its simplicity and the speed with which it operates. Fritz Haury and Hans Bömcke. Wochbl. Papier-Fabr. 66 (Tech. Teil), 64-8 (1935).

◆ Sizing Studies

Although the Rapid Köthen sheet machine was used in these sizing investigations, the dryer, the ordinary form of which has a vacuum attachment, as shown in the sketch in Fig. 1 (also illustrated in THE PAPER INDUSTRY, May, 1934, p. 129), was modified so that air pressure instead of suction could be used in the final drying of the sheet. The change in the construction of the dryer is shown in Fig. 2. After its formation, the sheet is removed from the screen and couched between felts and boards at 20 kg./sq. cm. pressure. Before it is finally dried, the test sheet is stretched and subjected to treatment with moist air at 90 deg. C. for a few minutes. In these experiments sulphite pulp (with 85.5 per cent alpha cellulose, 0.72 per cent lignin and a copper number of 2.86) was used. Various rosin sizes as well as montan wax and 50-50 mixtures of rosin and wax were employed. The final drying temperatures and the pH were important factors, and it was shown that preliminary moist heat treatment invariably increased the degree of sizing. Using rosin size (without wax addition), it was found expedient to maintain a pH of 4.5-5.0. With montan wax (alone) it was found essential to keep the pH

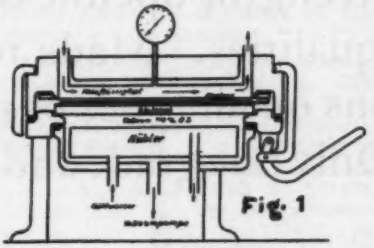
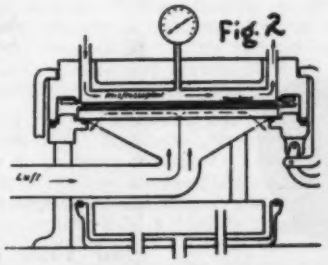


Fig. 1

range at 7.5-7.7. When rosin-wax mixtures were used this latter pH range was maintained. Normally with rosin sizes, the sizing becomes more efficient as the final temperature of drying increases, although with certain commercial sizes 120 deg. C. should not be exceeded. In the case of fully saponified rosin sizes, the temperature effect is least noticeable. In some cases very good sizing was already obtained when the final drying temperature had reached 80 deg. C. With montan wax, the opposite effect was noted. Increased final drying temperatures (especially with the so-called dark waxes) decrease the resistance of the test sheet to ink penetration. In the case of wax-rosin mixtures, the effect of temperature on sizing depends on the components used.



In a series of graphs, the author has plotted the final drying temperatures against the rate of ink-penetration (i. e., the measure of degree of sizing). While the results are very suggestive, they cannot be carried over into large scale sizing operations without a further study. Prof. Dr. von Possanner. Papierfabr. 33, No. 31 (T. S.) 257-60 (1935).

◆ New Suction Device for Fourdriniers

Reporting before the Northern Division of the Technical Section of the (British) Paper Makers Association, the author first outlines some of the general disadvantages of suction boxes. Among these may be mentioned:—the wear and tear on the under side of the wire, due to its rubbing over the covers of the suction boxes; the limitations in vacuum that can be applied without causing undue tension on the wire and the relatively large amount of power expended in overcoming friction. The present device (which is still in the experimental stage, and which is not entirely satisfactory as yet) shows promise of overcoming some of these difficulties. It is an endless belt of rubber, driven over two rollers and occupying the space usually held by some of the suction boxes. Grooves on the outer surface of the rubber run at right angles to the machine direction, so that the wire actually rests on the ridges between the grooves. At the bottom of these grooves are rows of holes which communicate with slots in a metal casting, and these slots are in turn connected with a vacuum pump. The metal strips support the rubber belt, and this supports the wire, the underside of which is thus freed from rubbing and friction. The underside of the rubber belt between the machined strips is exposed to ordinary atmospheric pressure so that an excess of pressure due to the vacuum is exerted only over an area equal to that of the strips. Water constantly lubricates the surface between rubber and wire. The advantages of the device are outlined, and some of the difficulties met with in its use are frankly discussed. For example, by means of the device the suction applied to the sheet may be very gradually built up in a number of stages, so that a firm consolidation of the fibers takes place before a high vacuum is applied, with consequent saving in fine fibers and loading materials. It should also actually obviate the necessity of a top couch roll. The proper running of the rubber belt (which presented difficulties in the author's preliminary experiments) is secured by guides at the ends of one of the belt rollers. The wear on the belt is evidently slight. One of several disadvantages observed was in the production of colored papers. There were faint markings on the sheet when acid dyes (and less frequently when certain pigments) were used. However, this difficulty may be overcome. F. W. Bailey. Paper-Maker and Brit. Paper Trade J. (T. S.), 90, No. 1, 106 (1935).

◆ The Gillet Method of Sizing

The Gillet size process (which was briefly described in THE PAPER INDUSTRY, June, 1935, p. 201) has been compared with other preparations in actual mill practice. The Gillet process has the advantage of adaptability since stable size milks could be obtained in which as little as 10 per cent and as much as 80 per cent free rosin was present. These comparative mill data indicate a 25 per cent saving in rosin, and a 25-30 per cent saving in alum. The article discusses briefly the technique used in making up the Gillet size, the equipment employed and the tests required for determining stability of the size. Ecke. Papier-Fabr. 33, No. 12 (T. S.), 105-8; Wochbl-Papier-Fabr. 66, No. 17, 323 (1935).

THE DRAPER FELT

Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

Made by

DRAPER BROTHERS COMPANY

CANTON, MASS.

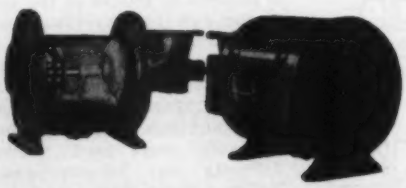
Woolen Manufacturers Since 1856

REPRESENTATIVES

L. H. BREYFOGLE, Kalamazoo, Mich. C. K. BEECHER, Delaware, Ohio

PACIFIC SALES COMPANY, Security Bldg., Portland, Ore.

Rebuild That Screen Room NOW. . .



Trimbey Pulp Screens

Increase Efficiency
Decrease Power

Also

PULP KNOTTERS
CONSISTENCY REGULATORS
WEIGHT REGULATORS
METERING SYSTEMS

Trimbey Machine Works

GLENS FALLS, N. Y.

Are Trimbey Screens Satisfactory?

YES!

says a well known Kraft Mill

In 1930 their Pulp Mill was completely equipped with a competing make of screen except for ONE Trimbey as a "yardstick."

March, 1934 2nd Trimbey installed
January, 1935 3rd Trimbey installed
July, 1935 4th Trimbey installed
October, 1935 THREE more Trimbey Screens ordered, and they write:

"We have decided to equip our Screen Room 100% with Trimbey Screens."

The Trimbey Screen is not restricted to Pulp Mill use alone but is particularly well adapted for Old Paper Stock from Breaker Beaters in BOARD MILLS.

Ask us for samples of screening.

PAPERMAKING PATENTS

IN THE UNITED STATES

Inquiries with reference to any of these patents should be addressed to James Atkins, Munsey Building, Washington, D. C.

Compiled by James Atkins, Registered Patent Attorney

2,016,085 — Paper Coating Process. Charles E. Fawkes, Chicago, Ill., and Colin Malcolm MacKenzie, Wabash, Ind., assignors to Container Corporation of America, Chicago, Ill., a Corporation of Delaware. Application November 30, 1934. Serial No. 755,308. 9 Claims. (Cl. 91—68). A process of applying a smooth coating of lacquer having a critical viscosity range to a sheet of paper which comprises delivering a film of said lacquer to an applicator roll, moving a sheet of paper across the surface of said applicator roll, and rotating said applicator roll in the direction of travel of said sheet at a predetermined lineal speed less than the lineal speed of the sheet whereby the lacquer film is sheared from the applicator roll at a rate sufficient to overcome the tendency of the lacquer coating to form distinctive ridges or flow lines on the sheet as it is being transferred.

2,016,647—Device for Treating Paper Stock. William B. McMartin, Hoosick Falls, N. Y., assignor to The Noble & Wood Machine Company, Hoosick Falls, N. Y., a corporation of New York. Application October 14, 1933. Serial No. 693,583. 5 Claims. (Cl. 259—97). A device of the character described comprising a chest, a vertical shaft rotatably mounted therein, means for rotating said shaft, a screw propeller having a plurality of blades mounted on the lower portion of said shaft, a tapered worm pitched in the same direction as the propeller mounted on the upper portion of said shaft and having its largest diameter at the top and extending from a point near the normal level of material in said chest to a point near said propeller, and a stationary ring slightly spaced from and extending about the periphery of said propeller for restraining the outthrow of material therefrom.

2,017,225—Method and Apparatus for Determining Recording, and Controlling the Density, Consistency, or Specific Gravity of Fluent Materials. George S. Witham, Jr., Lincoln, N. H. Application May 14, 1931. Serial No. 537,342. 23 Claims. (Cl. 92—46). In a device for indicating the consistency of paper stock, means forming a conduit through which the stock may flow, and means comprising an element floating upon and continuously movable by said flowing stock for indicating the consistency thereof.

In a device for regulating the consistency of a liquid material, means forming a conduit for the flow of liquid material therethrough, means comprising an element floating upon and continuously movable by said flowing material and automatic means responsive to variations in the rate of movement of said element for regulating the consistency of said material.

2,017,228 — Manufacture of Artificial Grindstones for Pulp Grinding. Raymond C. Benner, Niagara Falls, N. Y., assignor to The Carborundum Company, Niagara Falls, N. Y., a corporation of Pennsylvania. No Drawing. Continuation of application Serial No. 469,931, July 22, 1930. This application November 14, 1934. Serial No. 753,021. In Canada June 1, 1931. 12 Claims. (Cl. 51—280). A silica-lime abrasive article comprising a mixture of silica particles varying in size from coarse to fine, with the coarse, medium and fine particles in proportions of approximately two, one and two respectively by volume measured separately, the coarse particles in each of said coarse, medium and fine groups having a diameter of approximately 2 to 3 times the diameter of fine particles in the same group, and the fine group having a substantial proportion of particles passing through a 200 mesh screen.

2,017,339—Reenforced Fibrous Layer. Frank L. Bryant, East Orange, and Gustave S. Mathey, Elizabeth, N. J., assignors to Cellufoam Corporation, Chicago, Ill., a corporation of Delaware. Application November 11, 1933. Serial No. 697,628. 1 Claim. (Cl. 92—40). As a new article of manufacture, a gauze sheet, absorbent distended fibrous material attached to one side and moisture resisting distended fibrous material attached to the opposite side.

2,017,449—Separating Sheet Material. Herbert L. Thompson, East Pepperell, Mass., assignor to Nashua River Paper Company, East Pepperell, Mass., a corporation of Massachusetts. No Drawing. Application May 3, 1933. Serial No. 669,207. 2 Claims. (Cl. 91—68). Material for use as a separating sheet comprising a flexible fibrous sheet coated with a coating solution containing approximately 140 parts by weight of silicate of soda, 15 parts by weight of glycerine, and a relatively small amount of wax emulsion.

2,017,640—Treatment of Felts for Paper Machines. Leo Ubbelohde, Karlsruhe, Germany. No Drawing. Application January 4, 1933. Serial No. 650,139. In Germany January 6, 1932. 14 Claims. (Cl. 92—49). In the treatment of felts for paper making machines the use of dyestuffs.

2,017,810—Paper Blank for Paper Bottles and the Like. Andrew Bodor, Newark, N. J., and Lydia B. Koch, New York, N. Y., assignors to Reinforced Paper Bottle Corporation, New York, N. Y., a corporation of Delaware. Application March 9, 1933. Serial No. 660,089. 1 Claim. (Cl. 229—48). A paper blank for paper bottles wound convolutely into a plural thickness and having a series of indentations formed up adjacent the outer edge of the blank and on the inside face which lies against the main body to such a degree that the fibre of the paper is broken to such an extent that when adhesive is applied thereunto just prior to its being wound convolutely into a plural thickness to form a paper bottle the indented edge will curve and conform of its own accord to the curved outer surface of the convolutely wound body portion of the blank.

2,017,985—Manufacture of Cellulose. Erich Opfermann, Berlin-Charlottenburg, and Gustav-Adolf Feldtmann, Dessau in Anhalt, Germany, assignors to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany, a corporation of Germany. No drawing. Application June 9, 1933. Serial No. 675,116. In Germany June 15, 1932. 14 Claims. (Cl. 92—9). A process of manufacturing cellulose which comprises treating a cellulose pulp obtained by alkaline digestion with chlorine while maintaining during the chlorination a pH-value between 6 and 9 by continuous addition of alkali.

2,018,240—Machine for Making Corrugated Paper Board. George W. Swift, Jr., Bordentown, N. J., assignor to George W. Swift, Jr. Inc., Bordentown, N. J., a corporation of New Jersey. Application December 20, 1933, Serial No. 703,273. 8 Claims. (Cl. 154—31). In a corrugated paper board machine, the combination of a corrugated roll rotatable about an axis and constructed to mesh with a continuous corrugated web for conveying said web past an adhesive roll to a liner-applying roll, an adhesive roll arranged to apply adhesive to the outwardly presented tips of said corrugated web as said web is conveyed thereby around the rotary axis of said corrugated roll, a liner-applying roll cooperating with said corrugated roll at a peripherally spaced distance from said adhesive roll for applying a liner web to said corrugated web, said liner-applying roll being constructed and arranged to guide a continuous liner web into engagement with the adhesive-bearing tips of the corrugated web and to convey the liner web with corrugated web attached thereto away from said corrugated roll, and a receiver for compressed air, having an arcuate wall conforming to and presented in close juxtaposition to the corrugated roll between said adhesive roll and said liner-applying roll, said arcuate wall being provided with compressed air discharge outlets.

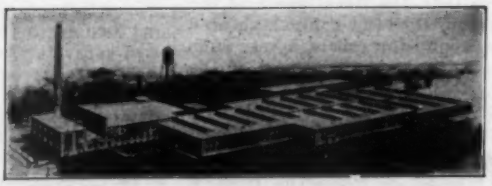
F.C.HUYCK & SONS

KENWOOD MILLS

ALBANY, N.Y.

KENWOOD
WOOL
PRODUCTS
REG. U.S. PAT. OFF.

Manufacturers of Kenwood Felts and Jackets for all Pulp and Paper Making Purposes since 1870



KENWOOD MILLS LTD. ARNPRIOR ONTARIO, CAN.

IN A HURRY?

IF YOU are in a hurry and need some information relative to mill equipment or supplies, or perhaps, some engineering data, just look for it in the PAPER and PULP MILL CATALOGUE.

¶ A copy of the catalogue is available to you in your mill. It has been compiled with the thought of being of greatest helpfulness to you as a purchasing, operating, or technical executive in the industry.

¶ Many of your questions will be answered quickly and easily by your references to it. You will find each section arranged for efficiency.

» » » Address all communications to the « « «

PAPER AND PULP MILL CATALOGUE

333 N. Michigan Avenue, Chicago, Illinois

The COMMERCIAL OUTLOOK

New York, December 2, 1935.

WHILE the approach of the year's close and the inventory period has led to a slowing down in market activity of some classes of paper, other lines of paper and board continue in good demand, and the market condition on the whole is very satisfactory to paper manufacturers and dealers. Demand for paper is far livelier than it has been in some years; mills in most cases have found it necessary to run at near to capacity in recent months and are still actively engaged, with new business coming in assuring a maintenance of production on a high scale for some time to come.

That business in general is improving steadily is apparent on all sides. Industrial production in the United States has consistently climbed in recent months until it is now very close to normal. The latest Federal Reserve Board report places it at 94 per cent of normal during October, a new high since 1930, except for the 1933 NRA boomlet, and predicting that figures for November will show a volume of production unequaled since 1930 or possibly 1929. Moreover, the report revealed that pre-Christmas trade in the principal retail centers was running from 5 to 25 per cent ahead of 1934. "A wide range of industries has shared in the gain," stated the Reserve Board, "and the increased industrial output has been accompanied by a rise in bank deposits, employment and building activity."

Distribution of paper during the first ten months of 1935 was larger by approximately 20 per cent than in 1934, with the gain representing tonnage moved, as prices practically were steady at last year's level, states a survey of the paper industry just completed. Profit margins, however, were narrowed by the rising production costs and the mounting tax payments. Both employment and payrolls have expanded during this year, as production has run ahead of that of 1934 by an average of 15 per cent, with the wrapping paper division exceeding the average.

The survey says that it is the general consensus of belief within the trade that next year will see at least a beginning toward the much needed price increase in most divisions of the industry. Inventories already are being accumulated by wholesalers in anticipation of such advances. The new uses for paper and paper products, which constantly are being devised, together with the steadily rising purchasing power, are being counted on to strengthen conditions and to push the volume of sales more rapidly upward during 1936.

Another survey of the industry emphasizes the development of new uses for paper and new paper products this year, and states that production within the paper industry has rebounded to 75 per cent of capacity. When it is considered that the peak of 84 per cent was reached in 1920 and that the 1929 figure was only 82 per cent, the current showing is regarded as very encouraging. With competition so intense a number of mills have been compelled to turn to the production of specialties and novelties which take them out of the range of competition, and these new products have been successful in broadening the markets for paper. Paper draperies, for instance, are the newest novelty in goods for the consumer and are receiving considerable attention. Strides have also been made in developing new paper products for purely mechanical and industrial uses. Paper insulation, for example, is being used more extensively by industrial plants. The chief gains this year, however, have been made by paper containers. Volume in both paper boxes and bags has spurted sharply, and producers of board and boxes have in some instances attained all-time peaks in sales.

The market position of newsprint is constantly improving. Consumption is rising at a fairly rapid rate, and is reflected in a steady climb of production figures of newsprint mills. The volume of newspaper advertising increased substantially during October, according to Advertising Age. Automobile advertising jumped 44 per cent over the same 1934 month, while newspaper advertising as a whole gained 5.9 per cent in October compared with the similar month last year. Retail advertising increased 7.3 per cent, while general advertising decreased 6 per cent.

Newsprint production in Canada during October set a new record for that month of 266,515 net tons, according to statistics issued by the News Print Service Bureau. The previous record was 252,046 tons in 1929. During October, Canadian newsprint mills operated at 78.9 per cent of rated capacity, against 74.6 per cent in September this year, 70.1 per cent in October last year, and 58.9 per cent in October, 1933. Cumulative total of production for the first ten months of 1935 was 2,245,703 tons, also a new record. In 1929, the best previous year, the total was 2,243,582, while in 1934 it was 2,118,879 tons. A large part of this year's gain over 1934 is accounted for by increased sales to overseas markets.

Newsprint output in the United States in October declined 826 tons to 79,746 tons from 80,572 tons a year ago. During the first ten months of this year United States mills produced a total of 761,009 tons, against 810,247 tons in the same time last year, a decline of 49,238 tons or 6.4 per cent. Shipments from Canadian mills in October were 266,679 tons and from U. S. mills 81,817 tons, bringing stocks down to 87,958 tons at mills in both countries, compared with 90,193 tons at the end of September last.

During the first nine months of 1935, mills in the United States produced a total of 2,410,575 net tons of paper board of all kinds, showing a large gain over the 2,082,138 tons produced in the same time of 1934, and comparing also with 2,301,048 tons in the first nine months of 1933. Board production in September last, at the rate of 74.1 per cent of mills' capacity, was at the highest level in more than two years.

◆ ◆

◆ Henry W. Foulds Elected Vice-President of Permutit

According to W. Spencer Robertson, president of The Permutit Company, New York, N. Y., sales of the company's water softening equipment have increased so rapidly, and so many new products are being developed, that a decided expansion of selling scope is in sight. To correlate and direct all sales, promotion and advertising, Henry W. Foulds has been elected vice-president of The Permutit Company.

Mr. Foulds, a graduate chemical engineer, brings to his new position twenty years' experience in selling. This experience embraces a number of years in the export business in South America; the positions of vice-president in charge of distribution of a well-known line of refrigerators and vice-president of a pump manufacturing company, and a diversified background in management and organization.

Assisting Mr. Foulds will be L. S. Ferguson, manager of industrial sales; O. P. Harris, manager of domestic sales, and H. H. Wilkinson, advertising manager.

◆ THE AMERICAN DISTRICT STEAM COMPANY of North Tonawanda, N. Y., announces the appointment of Edward A. Hahl to the Sales Engineering Staff. Mr. Hahl is prominently known in the water heater and heat interchange equipment field where he has been active for the past fourteen years. He will continue to specialize in this field with the American District Steam Company.

◆ PAUL O. ABBÉ, INC., Little Falls, N. J., announces the opening of an office in Chicago, located at 407 South Dearborn Street, where complete information on the company's ball and pebble mills and mixers may be obtained.

Season's Greetings:

At this season of the year our thoughts revert to those whose cooperation, loyalty and friendship in the past have so materially assisted us.

. . . . To You All, the Makers of TENAX FELTS extend these greetings:

A Merry Christmas and a Happy and Prosperous New Year

LOCKPORT FELT COMPANY

NEWFANE, N. Y.

An S&W JORDAN *for FINE PAPER MILLS*

S & W Jordans come in 4 standard sizes. Capacities are from 3 to 45 T of paper stock per 24 hours depending on the size and grade of paper. A steel cap does away with need of shrunk-on bands and may be used for several sets of filling. Initial cost and upkeep on these Jordans are extremely low. Bulletin sent on request.

The SMITH & WINCHESTER MFG. Co.
SOUTH WINDHAM, CONNECTICUT
Holders of the Original Jordan Patents

203

CUT EXPENSE--SAFEGUARD MACHINERY

IDEAL PORTABLE CLEANER

This is the cleaner for paper mills. The IDEAL "JUMBO" Portable Electric Cleaner *blows, vacuums, sprays* and is the most economical method for keeping motors, machinery and premises clean. Full 1 H.P. motor vacuums or blows with a 276 M.P.H. stream of dry air at low pressure.

Proves itself in every test!

FREE TRIAL Let us send you some interesting facts and free trial offer.

IDEAL COMMUTATOR DRESSER CO.
1028 PARK AVENUE SYCAMORE, ILLINOIS

ENGLISH ECCO CLAYS TRADE MARK CLAYS

UNIFORM • SUPERIOR • DEPENDABLE

English China Clays Sales Corporation
551 Fifth Avenue, New York City

Domestic RAW MATERIALS

◆ Papermaking Rags

Rags for papermaking display a firm undertone and in some instances tend strongly upward in value. The supply situation in general is on the bullish side; dealers and importers are exercising caution in entering sales commitments owing to difficulty experienced in covering orders; the outlook seems to foreshadow higher market prices, and it is quite apparent buyers are having little or no success in their quest for rags at other than full market levels.

Some of the high grades of new cotton cuttings have scored further price advancement. No. 1 new white shirt cuttings have climbed in value to where it is reported paper mills can scarcely buy these rags under 7.25 cents per pound delivered, if in any sizeable quantity at this basis. Dealers frequently are asking 7.25 cents f.o.b. their shipping points and holding firmly for this price. New soft unbleached muslins have risen to 7.25 cents or higher f.o.b. dealers' points, blue overall cuttings to 5.25 cents, light silesias to 5 cents, khaki cuttings to 4.25 cents, fancy shirt cuttings to 2.75 cents, washables to 2.25 cents, bleached canton flannels to 6.50 cents, and black silesias to 3.50 cents. It is nothing unusual for graders to demand above these prices, and refuse to sell unless securing the figures wanted. Fine paper manufacturers are purchasing new cuttings in guarded fashion yet have increased their buying to a considerable extent, while the export movement of some grades has assumed important dimensions, particularly No. 1 white shirt cuttings, importers having cleaned up the market of all these cuttings they could find at 6.50 cents a pound on dock at New York or other Atlantic ports.

Roofing rags continue to bring steady prices even though roofing felt mills are absorbing supplies in much smaller tonnage than recently. Consumers are showing distinct preference for domestic over imported roofing rags; in fact, it can be said buying of foreign stock during the past few weeks has been virtually at a standstill. Felt manufacturers evidently have supplied their needs for a time and are keeping out of the market other than for occasional purchases of a more or less "under cover" nature. However, offerings of domestic material are meeting ready takers, and prices on all kinds of roofing rags are holding their own, having registered practically no change in some while.

The outlook for roofing rags is regarded as decidedly bullish. Felt mills are expected to receive a further large increase in business in the new year as the building movement gets more under way, and will likely find it necessary to extend their purchases of rag stock appreciably. Dealers and importers lay stress on the sold up condition of the market, it being their contention that active buying by mills during the current year has cleaned up all accumulations and prevented any piling up of supplies here or abroad, and say that if mills' requirements expand further, something of a scramble to get needed supplies will ensue. Meantime, domestic No. 1 roofing stock is 1.70 cents or thereabouts per pound f.o.b. shipping points in the East, and No. 2 domestic 1.35 to 1.40 cents. Foreign dark cottons are quoted at 1.60 cents or higher ex dock New York, Spanish darks at 1.30 cents, and foreign linsey garments at 1.95 to 2 cents.

Activity in old white cottons and thirds and blues is mainly confined to shipments by dealers to mills they regularly supply, with steady to firm prices figuring in transactions. No. 1 repacked whites are quoted at 3 cents upwards at shipping points, depending on quality, and repacked thirds and blues at 1.75 cents.

◆ Old Paper

Although the last two months of the year ordinarily witness a slowing down of waste paper demand, it might be said the market has more than held its own in recent weeks. Most grades actually have improved their price position, at least slightly, and those which have not scored advancement have ruled firm. The basis for the firmness is that board mills, having been exceptionally busy, have bought waste paper in a persistent manner and in large volume, with the result prices have been accorded substantial support, aided also by a fairly strong supply condition.

Soft white shavings have risen in price to where sales of No. 1 ordinary packing have been reported in the East at 1.90 cents a pound f.o.b. shipping points, and of one-cut quality at 2.35 cents. No. 1 hard white envelope cuttings are quoted firmly at 2.35 cents or more f.o.b. dealers' points, white ledger stock has advanced to 1.15 and 1.20 cents, and old No. 1 kraft paper has moved up in price to 95 cents to $1 per hundred pounds. Such specialty grades as new kraft envelope cuttings and white news cuttings are held at premiums in price, the former quoted at around 1.85 cents a pound at shipping points and the latter at 1.40 cents or higher. Heavy No. 1 book stock continues to sell in the East at 50 to 55 cents a hundred pounds, folded news at 30 to 35 cents, and No. 1 mixed paper at 25 to 27½ cents f.o.b. shipping points.

◆ Rope and Bagging

Old rope is in better demand and somewhat firmer in price. Dealers generally ask at least 2 cents a pound f.o.b. shipping points for No. 1 domestic old manila, and 2.10 cents for No. 1 foreign ex dock New York. Old strings of all kinds are selling freely and at advancing prices. Anything in the form of old and scrap bagging is in keen demand and strong in price. Actual market levels are difficult to determine, but it is known that No. 1 scrap burlap has brought 1.90 cents a pound at shipping points in sales to paper mills, and probably in excess of this price. Gunny is approximately 2 cents for foreign and 1.90 cents for domestic ex dock and at shipping points. Roofing bagging is firm at 1.25 cents a pound for domestic packing at dealers' points.

◆ Pulpwood

Pulpwood is quotably steady with an upward tendency observable. The market is passably active, considering the period of the year and the fact the busy season is past.

◆ Mechanical Pulp

Indications point to groundwood production being curtailed in Europe during 1936, and it is expected this will aid the market here to no little extent, probably elevate prices at least to some degree and enable domestic and Canadian manufacturers to secure a profitable price for their product. European producers have agreed to cut their output 20 per cent next year, five of the principal producing countries, Russia, Sweden, Finland, Poland and Czechoslovakia, agreeing to the reduction.

Meantime the market is moderately active though developing no activity having much effect on prices. Canadian groundwood is quoted at $21 or $22 ex dock at American Atlantic seaports, while domestic groundwood is nominally $22 a ton in the open market f.o.b. grinding centers.

◆ Chemical Pulp

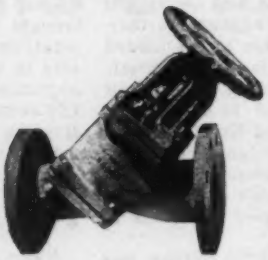
Most domestic wood pulp mills are well engaged, are experiencing a good demand for their product, are well fixed with orders and apparently are in a more satisfactory position than in some years. Pulp prices are steady to firm. There is a good deal of talk within the trade anent the probability of a rise in bleached sulphite quotations, but nothing has come to pass as yet. Bleached holds to a quotable level of 2.50 cents upwards per pound, depending on grade, ex dock American Atlantic seaboard, and unbleached sulphite is 1.85 to 2.05 cents a pound. Domestic bleached soda pulp is 2.50 cents delivered paper mills, and domestic kraft pulp about 2 cents or slightly higher on a delivered basis.

◆ Chemicals

Papermaking chemicals are advancing in price, for 1936 delivery. A rise of $2 per ton has been announced on bleaching powder on 1936 contracts, and chlorine is up $3 per ton on tank car contracts. Casein shows a firming trend, and so do other chemical items.

VALVE VALUE

Standard "Y" Valve



Type RS Valve

Corrosion Resisting Durco Alloy Steel Valves

Exceptionally high resistance to acids . . . freedom from contamination of liquids handled . . . long lasting . . . minimum maintenance . . . no sticking . . . that's what you will find in these Durco Alloy Steel corrosion resisting valves:

Standard "Y" Valve: Full opening; nearly straight flow.

Type RS Valve: Two-piece body. Easily converted into angle valve by rotating lower piece 180 deg.

Gate Valves: The 1″ and 1½″ sizes available with either split flange or screwed ends; the 2″ size with screwed and integral flange ends. The 3″ and larger sizes have integral flange ends only.

BUILT for PULP MILLS in the following ALLOY STEELS . . . . .

Durco KA2SMo—a truly low carbon austenitic alloy steel especially suitable for handling hot sulphite liquors.

Durimet—a chrome-nickel alloy steel especially resistant to weak sulphuric acid conditions found frequently in digester operations.

Further information regarding Durco Alloy Steel valves supplied promptly upon request.

Gate Valves

The DURIRON COMPANY
INCORPORATED
Exclusive Licensees for the Manufacture and Sale of Pansl Strainers in the U. S.
445 N. Findlay St. Dayton, Ohio

DURCO
KA2SMo
CARBON 0.07% MAXIMUM

TISSUE FELTS FROM OUR LARGE LOOM

TISSUE FELTS made by The Waterbury Felt Company have always been outstanding for their service, long life and production.

Now we offer these same quality felts made endless in all sizes up to 100 feet long, made on the latest type, wide felt loom built.

Write us about your requirements.

TRADE MARK

The TRADE MARK of GOOD FELTS

The Waterbury Felt Co.
SKANEATELES FALLS, N.Y.

Mills working long fibre stock like the new S. W. W. abrasive-steel combination bed plate. Others get best results with the S. W. W. diamond pattern; still others use the one on the right—the S. W. W. standard elbow pattern. Also builders of plates to customer's designs and specifications.

Beater bars in various patterns, including bars to user requirements out of carbon, alloy steels, stainless steel and bronze.

Also manufacturers of trimming knives, chipper knives, Dayton roll bar grinders, Dayton abrasive wheels, etc.

SIMONDS WORDEN WHITE CO.
OFFICE
DAYTON, OHIO
Factories at DAYTON-BUFFALO-CLEVELAND-BELOIT

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

As is usually the case as the year-end and inventory period draw near, activity in the imported wood pulp market has simmered off to some extent, yet paper manufacturers are evincing good interest and in the aggregate are purchasing pulp on a fairly large scale, not alone for current shipment from abroad but also for far-off delivery over the latter portion of 1936. The market tone is firm. No definite changes have occurred in quoted rates in recent weeks, but some classes of pulp have exhibited a strengthening price tendency, and talk has increased anent the likelihood of early advances.

Producers in Europe have in many instances adopted a rather independent attitude concerning sales to the United States while apparently expecting prices to rise and in no hurry to tie up their output for 1936. With the end of the old year approaching and with consuming buyers here not rushing in to cover new year requirements but buying reservedly, it is said that many of these producers abroad now are evincing greater desire for orders and in certain instances are inclined to press just a bit for contracts for 1936. This change of attitude on the part of European producers has not affected the market prices prevailing but it has put to rest, at least for the time being, talk in the trade of the probability of price advances in pulps in the immediate future.

Kraft pulp exhibits perhaps the strongest price tone, and Swedish mills are reported refusing anything less than 1.80 cents, or certainly not under 1.75 cents, for prime kraft for forward shipment from abroad landed at U. S. Atlantic ports. Some brands of prime kraft are quoted at 1.85 cents, while spot lots in this country have been sold at 1.90 cents, ex dock basis. Bleached sulphite is 2.50 cents upwards per pound, depending on grade, ex dock American Atlantic seaboard, while prime strong unbleached sulphite is 1.90 to 2.05 cents ex dock American Atlantic ports. Scandinavian groundwood is quoted at $21 to $22 for dry and $22 to $23 for moist per short ton at Atlantic ports.

An important development in mechanical pulp is an agreement reached and signed by five principal producing countries in Europe; namely, Russia, Sweden, Finland, Poland and Czechoslovakia, to cut production 20 per cent annually. The aim is to improve the supply situation in Europe during 1936, and by this means to elevate market prices of groundwood to levels enabling manufacturers to realize a profit.

Imports of wood pulp into the United States increased during September compared with the several previous months, and, in fact, rose to a higher point than in any preceding month this year with the single exception of January last. Chemical pulp imports reached a total of 148,114 short tons in September, valued at $5,748,988, according to U. S. Department of Commerce figures, contrasted with 135,508 short tons of a value of $5,344,071 in August this year, and 124,591 long tons of a value of $4,971,827 in September last year. The September arrivals brought the total for the first nine months of 1935 up to 1,146,270 short tons, contrasted with 1,040,616 long tons in the same time of 1934. Groundwood imports in September were 13,230 short tons of a value of $246,141, compared with 12,768 short tons of a value of $200,723 in the month before, and 17,249 long tons of a value of $296,911 in September last year, and making a total for the first nine months of the current year of 116,867 short tons, against 121,283 long tons in the corresponding period last year.

These figures indicate that imports of chemical pulp during 1935 will about equal the total tonnage imported in 1934, or will very closely approximate last year's receipts, whereas imports of mechanical pulp apparently will register a decline this year contrasted with 1934.

◆ Paper

Importations of paper into the United States are showing a gain in point of total value compared with last year. During September, imports reached a value of $7,670,204, against $7,759,917 in the preceding month, and $6,505,898 in September, 1934. The nine months' imports this year totaled in value $65,951,530, contrasted with $62,757,196 in the same time of 1934. Most of this increase over last year was made up of larger imports of standard newsprint paper, receipts of which in nine months of this year were valued at $57,993,067, against $54,953,430 a year ago. The next most important grade of paper imported is cigarette paper, imports of which in nine months of this year were valued at $2,447,304.

◆ Paper Stock

Imports of papermaking rags into the United States in September amounted to 18,068,576 pounds, valued at $244,200, according to U. S. Department of Commerce statistics, comparing with 20,429,055 pounds of a value of $315,778 in the preceding month, and 7,715,972 pounds of a value of $123,763 in the similar month last year. The September arrivals brought the total for the first nine months of the current year up to 132,314,159 pounds of a value of $1,591,286 and showing a sharp increase over the 80,690,769 pounds of a value of $1,020,289 in the same nine months of 1934. Imports of miscellaneous paper stock, including old rope, bagging, waste paper, etc., in September were 5,350,111 pounds, valued at $80,092, and making a total for nine months this year of 55,121,010 pounds of a declared value of $787,185, against 41,104,767 pounds of a value of $590,560 in the corresponding time a year ago.

EXPORTS

Exports of paper from the United States are registering a fair rate of gain this year over last year, according to official figures issued by the U. S. Department of Commerce. Exports in September last amounted in value to $1,586,171, contrasted with $1,716,568 in the preceding month, and $1,746,759 in the similar 1934 month. Exports during the first nine months of the current year reached a total value of $15,008,098, representing an increase of 7.2 per cent over the shipments valued at $13,990,039 in the same period of 1934.

Exports of standard newsprint in nine months this year were valued at $633,713, against $729,800 in the same time a year ago; of uncoated book paper, $733,862, against $682,487; of wrapping paper, $1,355,210, against $1,363,276; of writing paper, $1,252,770, against $918,050; of tissue and crepe paper, $410,670, against $480,806; of toilet paper, $506,220, against $444,624; of surface coated paper, $642,879, against $572,742, and of sheathing and building paper, $193,347, against $161,181.

Shipments of boxboard abroad were valued at $899,782 in nine months, compared with $693,264 a year ago, and of other paperboard at $641,931, contrasted with $587,916. Exports of paper bags were valued at $551,536 in nine months, against $581,588 last year, and of paper boxes and cartons, $454,154, against $491,730.

Exports of paper base stocks from this country in the first nine months of this year were valued at $7,146,868, a considerable rise over shipments of a value of $5,867,636 in the same 1934 period. Sulphite wood pulp comprised the bulk of these shipments, amounting in value to $5,969,338, against $4,919,702 last year.

ADVERTISING PAGES REMOVED

ALUMINUM SULPHATE

PAPER MAKERS' ALUM

GENERAL CHEMICAL COMPANY

manufactures to standards of purity and uniformity nowhere excelled —standards which are identical in each of the company's many plants. For prompt attention address your inquiry to the office nearest you:—

40 Rector St., New York, N. Y.

Sales Offices: Atlanta, Baltimore, Boston, Buffalo, Charlotte, Chicago, Cleveland, Denver, Kansas City, Los Angeles, Minneapolis, Philadelphia, Pittsburgh, Providence, San Francisco, St. Louis

CABLE ADDRESS: Lycurgus, N. Y.

In Canada: The Nichols Chemical Co., Ltd., Montreal, Toronto

$500.00 REWARD

It is illegal outside the Irish Free State to print Irish Hospitals' Sweepstake Tickets or Receipt Blanks, or to manufacture or use for printing, paper watermarked with the words

AUTHENTIC SWIFT BROOK
PAPER MADE IN
SAGGART, IRELAND

All copyrights respecting these printings and watermarked paper are vested only in certain firms in the Irish Free State.

The above-mentioned reward will be paid to the person supplying me or their local police with the first information leading to a successful prosecution for violation of these copyrights.

PHILIP O'REILLY, Solicitor
Bank Buildings
1 Upper Ormond Quay
Dublin
IRISH FREE STATE

[ONLY LETTERS CONCERNING THIS REWARD SHOULD BE SENT TO THE ABOVE ADDRESS]